TROPICAL DISEASES BUREAU.

TROPICAL DISEASES BULLETIN.

Vol. 19.] 1922. [No. 1.

LEISHMANIASIS: A REVIEW OF RECENT LITERATURE.

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I. KALA AZAR.

During the past ten years very few important advances have been made in our knowledge of kala azar, with the fortunate exception of the discovery of the specific action of antimony, chiefly in the form of tartar emetic, in the treatment of the disease. We are no nearer the solution of the problem of its transmission and not many new facts of importance have been elicited. No additions to our knowledge have been made, as regards symptomatology and pathology, beyond what may be found in any up-to-date text-book, and no fresh information regarding the structure of the organism causing the disease and its development has come to light. The disease still occurs in the well-known endemic centres of North China, India, the Caspian region, Mediterranean littoral, and the Anglo-Egyptian Sudan, while new foci in Mesopotamia, Sumatra, and Siam, and in the districts around Lake Chad have been discovered. The similar and associated disease which occurs in dogs in the Caspian and Mediterranean regions, and also near Lake Chad, still requires an explanation in view of its entire absence from other endemic centres. Experimental work with animals has attracted considerable attention, but the uncertainty of producing infections has hampered the advances which this line of research was expected to yield. It has been claimed by some observers that many insect flagellates, which have been regarded as peculiar to these animals, are inoculable to vertebrates, and that infections are produced which bear some resemblance to the natural diseases of man and dogs due to leishmania. These observations would tend to confirm the view that leishmaniasis is due to an insect flagellate having invaded the vertebrate. Doubt has, however, recently been thrown on many of these experiments.

Distribution.

Assam still appears to be the most important endemic centre of the disease, and McCombie YOUNG (1920) believes that there is a most disquieting increase in its incidence which calls for immediate action. KÜLZ (1916) reports having found leishmania in the spleen of

(4964) Wt. P13.71 1500 1/22 Harrow G75/1921 A

a sick Arab in the Bagdad district of Mesopotamia, and that KADIR, who continued his investigations, had diagnosed kala azar by spleen puncture in eight of twelve cases examined. LOW (1919) treated a case of kala azar in England. According to him the infection was undoubtedly contracted in Bagdad, though LEDINGHAM (1919) considered it possible this had occurred in India five or six months before. The unsatisfactory accounts of the discovery of leishmania in cases of supposed kala azar in the East Indies by DE RAADT (1909), ELDERS (1909) and NEEB (1909) rendered it extremely doubtful if the disease occurred at all in the countries directly east of India. SMITS (1916) has, however, discovered *L. donovani* in six cases locally infected in Sumatra, while MENDELSON (1919) found the parasite in one case from Siam. In China the disease still appears to be limited to the district between the Yangtse and Pekin, as first described by COCHRAN (1913–14). WYLIE (1920) gives an account of 35 cases, 15 of which were diagnosed by spleen puncture, from this region.

In the Mediterranean area the distribution appears to be the whole of the littoral, along which individual centres are constantly being incriminated. Thus, PATANE (1917) has discovered a case in Libya; KLIPPEL and MONIER-VINARD (1921) have recorded the first case from Morocco, and CARNOT and LIBERT (1921) one from Macedonia. MAYER and REINHARD (1918) recorded an infection which was apparently acquired in Asia Minor. The disease, though generally occurring near the coast, may occur further inland, as in Spain. A case was recorded from Lisbon by ALVAREZ in 1910. More recently LABBÉ, TARGHETTA and AMEUILLE (1918) described two cases from Nice in Serbian refugees. They have assumed that the disease was contracted in France. GIOSEFI (1918) observed a case in Trieste. There is no fresh information about the disease in Egypt, nor in the endemic area in the Sudan bordering on Abyssinia, except for records of isolated cases since the issue of the report of the Sudan Kala-azar Commission (1911) and no fresh cases have been recorded from the districts about the Caspian Sea since GURKO'S paper in 1913. In 1916 BOUILLIEZ described the first case in a child in the Lake Chad district of West Africa, while TOURNIER (1920) recorded one from the Gaboon. As regards America, the only observation is still that of MIGONE (1913), who saw a case in an Italian who had resided in Paraguay for sixteen years. It is doubtful where he contracted the disease, for he had apparently visited Italy from time to time.

Canine kala azar occurs, as does the human disease, in the Mediterranean littoral and in the Caspian region. As is well known, in certain cases dogs and children have been found infected in the same house. This close association is far from being always observed. NICOLLE (1921) finds that in the Tunis district the canine disease is more widespread than that of children. DELANOË and DENIS (1916) discovered the disease in dogs in Morocco, and it is only recently that the first human case has been seen there. PRINGAULT (1914) found that dogs were infected in Marseilles, but no human cases have been noted in this locality. NELIGAN (1913) found a generalized leishmania infection of a dog in Teheran, but kala azar in man is unknown in Persia. In West Africa the canine disease was noted by LAFONT and HECKENROTH (1915) at Dakar in Senegal. No one has yet discovered kala azar of dogs in India, nor has it been seen in America. Even if we admit that the canine disease is due to the same organism as that producing kala azar in man, it is evident that the dog does not play any essential rôle in its spread, though there is every possibility that it occasionally passes from dog to man or vice versa.

Diagnosis.

The diagnosis of kala azar depends upon the discovery of the parasite, and spleen puncture still remains the most reliable and rapid means of attaining this object. The importance of establishing the diagnosis, especially where new drugs are being tested, is well illustrated by the observation of NICOLLE (1921) in his account of the cases observed in Tunis. Spleen puncture was performed in 172 cases which were suspicious and in only 59 was a diagnosis of kala azar established. Various other methods of discovering the parasite have been advocated, and if these give positive results puncture of the spleen can be dispensed with.

1. *Direct examination of the peripheral blood.*—Many observers, including CHRISTOPHERS, DONOVAN, and especially PATTON, have demonstrated the frequency with which leishmania can be discovered in the peripheral blood of cases of kala azar. PATTON (1912) recorded the results obtained from the examination of 84 cases in Madras; in 42 of these the parasites were discovered in the first film examined, in 13 in the second, in 12 in the third, in 5 in the fourth, in 2 in the fifth, and in 4 in the sixth; in the remaining cases the parasites were not discovered till a larger number of films were examined. Similar results were also obtained by KORKE (1914) in Madras. MACKIE (1914 and 1915), from the examination of 245 cases, found the parasites in the peripheral blood of 21 per cent. of the indigenous Assamese and in 64 per cent. of the tea-garden coolies. More recently KNOWLES (1920) succeeded in 32 out of 72 cases; this result necessitated the examination of 671 blood films. In the Sudan MARSHALL (1912) observed the parasites in the blood of 80 per cent. of cases examined. In the Mediterranean disease NICOLLE and CASSUTO (1908) had observed the parasites in the blood of one case. CANNATA, in Italy (1913 and 1914), discovered leishmania in the blood of 15 out of 16 cases, an observation which required the methodical examination of 20 to 30 films from each case. Similar results were obtained by VAGLIO (1914) in 11 cases, and by RUTELLI (1914) in 7 cases.

It is evident from these results that parasites are frequently present in the peripheral blood. They are generally within mononuclear leucocytes, but may occur in other cells. Their discovery, however, appears to be not always an easy matter, and it evidently necessitates the careful examination of a series of well-prepared films from each case.

2. *Culture of peripheral blood.*—A reliable and easy method of cultivating the organism having been discovered by NICOLLE (NNN medium), it was hoped that blood culture would yield more uniform results than direct examination of the blood. MAYER and WERNER (1914) and WENYON (1914) were the first to demonstrate that cultures could be obtained by inoculating tubes of NNN medium with a few drops of the peripheral blood. ROW (1914), in India, was also successful with a more elaborate method; the blood from the finger was mixed with a citrate saline solution and allowed to deposit for 12 to 24 hours; the deposit was then inoculated into culture media. It is stated that this method obviates the addition to the medium of excess of human serum, which is detrimental to the growth of the parasite. GIUGNI (1914) and CANNATA and CARONIA (1914) also obtained successful results in Italy. CORNWALL and LA FRENAIS (1916) obtained cultures from the blood in seven cases in India. KNOWLES (1920), working in Assam, found that this culture method,

though sometimes yielding very good results, was disappointing as a reliable diagnostic procedure.

Blood culture is certainly a method which should be employed, especially in cases in which spleen puncture is contraindicated. The disadvantage is that the number of parasites inoculated to the medium is so small that often two or three weeks must elapse before flagellates are detectable.

3. *Examination of lymphatic glands.*—COCHRAN (1913) advocated the excision of a superficial lymphatic gland under a local anaesthetic. The gland is cut in half and a smear made from the cut surface. Puncture of the gland without excision did not give good results.

4. *Serum tests.*—The fact that blood serum from kala azar cases was liable to produce a copious precipitate when mixed with water was noted by BRAHMACHARI (1917). In a later publication (1920) this observer advises the addition to the serum of two parts of distilled water. A precipitate was obtained in 20 consecutive cases of kala azar and not in other diseases. RAY (1921) again describes what is undoubtedly the same reaction. To two drops of blood in a tube are added 20 drops of distilled water. In kala azar the mixture shows a turbidity and, on standing, a flocculent precipitate. It seems probable that this explains an observation made by HILL (1913) in China, who noted that in making blood counts in eight consecutive cases of kala azar it was impossible to get the blood to mix uniformly in the pipette, as the blood ran together into clumps. He described the phenomenon as a new sign in the disease. The diluting fluid was a mixture of 1 part of a methyl alcohol solution of Wright's stain with 3 parts of 0·1 solution of sodium chloride in distilled water. It seems that this peculiarity of the blood in kala azar is worthy of further investigation.

Another test which must still be regarded as in the experimental stage is the "formol-gel" reaction advocated by GATÉ and PAPACOSTOS for syphilis. The addition of a couple of drops of commercial formol to about 1 cc. of clear serum causes the mixture to jellify in 24 to 30 hours. SPACKMAN (1921) called attention to the fact that in kala azar the solidification occurred in a few seconds. NAPIER (1921) tested 50 cases of proved kala azar, and noted that solidification of the serum occurred in less than half an hour in 49 of these. In other cases tested, such as malaria, a jelly was not formed till after the expiry of 24 hours. FOX and MACKIE (1921) have devised a simple technique for this reaction. A drop of clear serum is placed on a slide, and this is inverted over a watch glass containing a few drops of formol. In a few minutes the kala azar serum will have solidified, whilst other sera remain fluid. It would appear that this test is of greater promise in kala azar than in syphilis, in which disease it is now regarded as of little, if any, value.

Many observers have attempted to devise a test for kala azar based on the presence of antibodies in the blood. The most extensive investigations are those of CARONIA (1913). He showed that suspensions of the flagellates could be agglutinated or precipitated by the serum of rabbits which had been subjected to inoculations of killed cultures. The serum of naturally infected children showed a reaction which was too feeble to be of diagnostic value, though the administration of a vaccine of killed flagellates increased the potency of their sera, as it did in rabbits. The reaction of deviation of the complement has likewise yielded discordant results.

None of the tests based on serum reactions can be regarded as a substitute for the discovery of the parasite in really scientific work.

Age of Infected Persons.

When it was discovered that kala azar existed in the Mediterranean area, and that here young children were almost exclusively attacked, this form of the disease was named Infantile Kala Azar, and the parasite causing it *Leishmania infantum*, as it was generally considered that in India the disease was essentially one of adults. More recent and careful observations have tended to demonstrate that such a distinction does not actually exist, for in the Mediterranean area adults are not immune to infection, while in India children are more often attacked than was at first supposed. MACKIE (1914) conducted a kala azar survey in the Nowgong district of Assam. The cases were tabulated as Typical, Probable, Suspicious and Doubtful. By performing spleen puncture in a certain number of each group, it was determined that all the typical and probable cases and about half the suspicious ones were actually cases of the disease. Of 195 cases which could thus safely be assumed to have kala azar, 9 were between the ages of 1 and 5, 100 between 6 and 10, 49 between 11 and 15, 17 between 16 and 20, 12 between 20 and 30, and 8 over 30. Of a series of 143 cases treated by MUIR (1917), 25 were under 6 years of age, 56 from 6 to 12, 26 from 13 to 16, 21 from 17 to 25, and 15 about 25. He remarks that kala azar is thus much commoner in children than adults. KNOWLES (1920) gives for 86 patients, all diagnosed by discovery of the parasite, an average age of 21·41 years. Fifty-eight of these cases were between 10 and 26 years of age. There was a maximum age of 40 and a minimum of 2. COCHRAN (1913), in China, found the age in 16 definitely diagnosed cases to vary from 4 to 35 years. In his account of 35 cases, 15 of which were diagnosed by spleen puncture, in the same country, WYLIE (1920) found the ages to vary from 4 to 30 : all of these were males, a fact which is easily understood in view of the known reluctance of the Chinese to allow their women to be seen. In the region of the Caspian it is known that the disease attacks chiefly children and young adults. GURKO (1913) describes four cases from this area. Their ages were $6\frac{1}{2}$, $6\frac{3}{4}$, 16, and 19. In the Sudan, MARSHALL and THOMSON (1911) found that kala azar occurs in persons of 12 years of age and upwards. In the whole of the Mediterranean region the disease is undoubtedly most common in young children, as all the records show. Adults, however, are occasionally attacked. TASHIM (1910) recorded two cases from Tripoli in persons 11 and 18 years of age. GABBI (1909) saw the disease in a youth of 18, a man of 38, and three boys of 13. SPAGNOLIO (1911) saw a case in a man of 35. Similarly, cases in adults have been described by FULCI and BASILE (1911), CHRISTOMANOS (1911), ARCHER (1907), BASSETT-SMITH (1913), TRANTAS (1915), WARD (1916), KERR (1918), CARNOT and LIBERT (1921), and others. It is thus evident that the Mediterranean disease attacks adults and the Indian disease children as in other endemic areas, and it can no longer be maintained that infantile kala azar is distinct from that of India. This conclusion is borne out by all the clinical features of the disease and the character of the organism producing it.

Treatment.

The greatest advance has been made in the treatment of the disease. To GASPAR VIANNA (1913) is due the credit of first bringing to the notice of the medical world the specific action of tartar emetic in cases of South American cutaneous leishmaniasis. His observations

were quickly confirmed, while, in Italy, Di Cristina and Caronia (1915) discovered that the drug was equally efficacious in the treatment of kala azar. Rogers (1915) was the first to employ the drug in India. Since then it has been used on a large scale and has given most satisfactory results. It is now recognized as the accepted method of treatment, and though attempts have been made to discover more easily administered or less toxic substitutes, tartar emetic and its corresponding sodium salt are still the only remedies which are generally employed.

Tartar Emetic. India.—In a letter to the *British Medical Journal* for July 31, 1915, Rogers reported that he had been using tartar emetic in the treatment of kala azar in India with promising results. Accounts of the success of this form of treatment were contained in two papers by Rogers (13 cases) and Muir (9 cases) which appeared in the October number of the *Indian Medical Gazette* for 1915. Of the 13 cases treated by Rogers, 8 were either cured or improved, while 4 either had not changed or were worse, and 1 had died. Muir reported that 8 of the 9 cases treated by him had shown uniform and rapid improvement, while one had died of phthisis. In both series of cases the diagnosis had been established by spleen puncture and discovery of the organism. Rogers and Hume (1916), and Rogers (1916–17) gave details of the treatment of 35 Europeans, 6 of which were children. Diagnosis was made by discovery of the parasite in all of these, except 5 of the children in which the symptoms were sufficiently characteristic to justify the diagnosis of kala azar. Of the 35 cases, 26 were reported as cured, and 8 improved, while one died from phthisis. The cases which were recorded as improved were either still under treatment, or had left hospital prematurely. There had been no known relapse amongst those considered as cured, the majority of which had either been seen or heard of for several months up to a year after discharge from hospital. Rogers (1917) gave the results of the treatment of a series of 13 natives of India, and leishmania was seen in all but one of these. Eight were stated to have been cured, three much improved, and two to have shown no change. In 19 of the cases in which parasites had been discovered and a second puncture of the spleen was performed when cure was considered to have taken place, it was found that leishmania was no longer present. Rogers noted that treatment had to be continued for some time after apparent recovery had taken place, and that the results fully confirmed the sanguine expectations aroused by his previous experience.

After Rogers had introduced the tartar emetic treatment in India it was adopted by other observers. Muir (1916) gave an account of the treatment of a series of about 100 cases, and in 1917 another series of 143 cases, all in natives. In the first series, it is stated that the diagnosis had been made by spleen puncture in the majority of the cases, and, though no details are given, that all cases recover absolutely if treatment is begun before the last stage of the disease is reached. More details are given of the second series of 143 cases. Spleen puncture confirmed the diagnosis in 72 of these, as there was some doubt as to the diagnosis. In the remaining cases the clinical features and blood condition made the diagnosis so clear, that spleen puncture was not performed. Of the 143 cases, all but 46 were discharged as cured. Of the latter, 13 died and 33 discontinued treatment of their own accord, and of these 29 did so because their relatives considered that a cure had already occurred. Muir remarks that it is safe to conclude that of the 143 cases, 126 were either cured or would have been cured if the full course of treatment had been taken.

Another series of 86 cases in which diagnosis was confirmed by finding of the parasite and where tartar emetic treatment was employed is described by KNOWLES (1920). Of the 86 cases, 46 were discharged as cured. In 31 of these, a spleen puncture performed before discharge had failed to reveal any parasites. Of the remaining cases, 11 were progressing favourably towards recovery, while six had absconded before the treatment was completed. One case was evidently dying, and 22 had actually died. The deaths were due to influenzal pneumonia, 6 ; acute dysentery, 5 ; asthma and cardiac failure, 5 ; nephritis and cardiac failure, 2 ; and broncho-pneumonia, dysentery and nephritis, 4. Some of those who died of influenzal pneumonia were already cured of their leishmania infection. Good results following the use of tartar emetic in properly diagnosed cases were reported by MACKIE (1915) one case, BRAHMACHARI (1915) a few cases, GHOSH (1916) four cases and JACKSON (1916) one case, while LOW (1919) recorded the treatment of a case which had apparently contracted the disease in Mesopotamia. Death from influenzal broncho-pneumonia unfortunately occurred when cure had taken place.

In Assam treatment by means of tartar emetic has been adopted on a large scale and records of the success of the treatment are accumulating. In most of these no statements as to the discovery of the parasite is made, so that it is possible that other diseases than kala azar may have been occasionally included. Owing to lack of hospital accommodation and other causes many cases are being treated as out-patients, as mentioned by MUIR (1917). KUNDU (1920) writes of the popularity of the tartar emetic treatment amongst natives in Assam. At the time of writing 45 cases were being treated as out-patients and 16 as in-patients at Nowgong. The treatment of out-patients is unsatisfactory, as the people cease to attend as soon as the initial improvement has taken place, whereas in order to effect a cure treatment must be prolonged.

In 1918 ROGERS recorded the fact that he had completely given up the use of tartar emetic in favour of the corresponding sodium salt—sodium antimonyl tartrate—on account of its lesser toxicity. This salt of antimony had been used by BRAHMACHARI (1916) and GHOSH (1916), with favourable results. ROGERS concluded that it is at least as effective and probably more so than tartar emetic. DODDS-PRICE (1920) has given over 3,000 injections himself, and has watched the effect of twice this number given by his assistants, in Assam. In most cases tartar emetic was apparently used, but he calls attention to the superiority of the sodium salt. He concludes that in these salts we possess the means of curing the vast majority of cases of kala azar, provided treatment is commenced in the early stages of the disease. ELWES (1920) also writes of the good results of the tartar emetic treatment, but agrees that the sodium salt is to be preferred.

It is evident from the above accounts that by the use of tartar emetic or the corresponding sodium salt there is every prospect of bringing about a cure in Indian kala azar, provided the treatment is commenced early enough and is continued for a sufficient time after improvement has taken place. Since its first employment much has been learnt as to the best method of giving the drug and the length of time it is necessary to continue the treatment. In 1917 ROGERS pointed out that the maximum dose required to destroy the parasites, when given every third day, or twice a week, over two or three months, is about 1 cc. of a 2 per cent. solution for every 10 lb. of body-weight. The maximum dose for a European, however, must not exceed 10 cc. and for an Indian

7 cc. This maximum dose must only be reached gradually after commencing, in persons of 12 years of age and upwards, with about 5 cc. if there is no debility. In children and old people the initial dose must not exceed one-third of 1 cc. per 10 lb. of weight. Cases were defined as cured when the fever had completely ceased for two or more months, when there had been considerable gain in body-weight, and a restoration of the blood, and especially of the white corpuscles, to the normal, and a decided diminution in the size of the spleen.

Attention was drawn to the toxic effects of tartar emetic. It was realized that great care had to be exercised in administering the drug, and that it was necessary to commence with small doses and gradually to increase them. Three deaths following injections of tartar emetic are mentioned, but in these cases it was found that the solution contained a white precipitate. ROGERS (1919), however, recorded a case which died as a result of the toxic action of the sodium salt. The necessity of using only perfectly clear solutions is emphasized.

MUIR (1916–17) stated that injections should be given every second day till fever had been absent for a month and then once a week for two to four months. Unless these weekly injections are continued relapse may occur.

Some very interesting facts were elucidated by KNOWLES (1920) during his experiences in Shillong with tartar emetic. The first effect of treatment is the immediate disappearance of parasites from the peripheral blood. The second result is their gradual disappearance from the spleen, while the third is the cessation of fever. At the same time there is a steady increase in body-weight, decrease in size of the spleen, and a return of the blood picture to the normal. The rate of disappearance of parasites from the spleen varies, but, speaking generally, they may be said to become scanty and difficult to find after 100 cgm. have been given, while after 200 cgm. a cure is assured. That the parasites are still alive after considerable doses have been given is proved by the fact that cultures were obtained after the administration of 18, 31, 49, 89 and even 174 cgm. The spleen steadily diminishes in size and may even become impalpable. This latter result is not always seen, for the spleen may still be palpable even in cases which have evidently been sterilized of their infection. During treatment the liver may actually increase in size, and it is suggested that this may be a result of accumulation of tartar emetic in the tissues. The directions given by KNOWLES (1920) for the administration of tartar emetic as practised at Shillong are as follows :—

" (*a*) The potassium salt is the one used at Shillong ; and the ' heavy powder ' should alone be used ; not the ' light powder.'

" (*b*) The solution is of strength 1 per cent. in normal saline ; autoclaved at 110° C. for ten minutes, and kept in a rubber-capped flask.

" (*c*) If there be the least trace of deposit or opalescence in the solution it must be discarded, and is not safe to use.

" (*d*) Beginning with an intravenous dose of 3–4 c.c. for an adult, the injections are given on alternate days, and the dose gradually raised to 10–12 c.c., above which dose it is not advisable to go. At first the full effect of the injection seems to fall upon the parasites ; later, as the patient becomes cleared of infection, the tissues seem to become *more* susceptible to the drug. There is little, if any, evidence of acquired immunity to antimony, and there may be, to some extent, accumulation in the liver. Hence, towards the end of treatment the dose should *not* be pushed and the intervals between doses should be increased.

" (*e*) The standard course at Shillong is a course of 200 cg., distributed over a period of two and a half to three months. . . .

" (*f*) The injections should not be given within two hours of a meal.

" (*g*) Accessory treatment by tonics and the clearing of any helminthic infection is essential. Sodium morrhuate is useful in fattening patients.

" (*h*) In the presence of complications the tartar emetic should be continued, unless there are very serious contra-indications. In a recent case, where a child appeared for ten days to be *in extremis* with what seemed to be the terminal dysentery, the injections were continued and the child made a good recovery at the time. . . . Nephritis is the most difficult complication to treat, but as the nephritis is the result of interstitial fibrosis of the kidney from parasite infection, the injections should be continued cautiously. In brief, complications are an indication to reduce the dose and proceed cautiously, but do not necessitate the abandonment of treatment.

" (*i*) The state of the heart and the examination of the urine should be attended to. The sudden appearance of oedema may be a danger signal. In giving the injections at Shillong, as also in doing spleen puncture, pituitrin and adrenalin are kept handy, although there is hardly ever any occasion to use either drug.

" (*j*) No accidents, sepsis, thrombosis, phlebitis or other ill effects have been seen. The use of a rather large needle (20 c.c. Roux syringe needle) seems better for intravenous work than that of a very fine needle, as it is easier with the former to make certain of being in the lumen of the vein. Count 'eight' slowly over the injection of each c.c. The 2 per cent. solution—to judge from one or two cases treated with it before arrival at Shillong—seems more liable to cause local irritation if the vein be missed. This is not seen with the 1 per cent. solution."

Mediterranean area.—As already pointed out, tartar emetic for the treatment of kala azar was originated by Di Cristina and Caronia (1915) in Italy. In their first paper they describe the treatment of 10 cases, the ages of which varied from 15 months to 6 years. The solution used was a 1 per cent. tartar emetic, which was injected with a fine needle into the median basilic, external jugular, or temporal vein. The commencing dose was 2 cgm., and this was increased to 10 cgm. Of the cases cured the eldest child received 84, and the youngest 35 cgm. Two cases which were in the final stage of the disease died soon after treatment was commenced, while a third died of acute nephritis. The remaining 7 cases were either cured or were reported as progressing so favourably that a cure was ensured.

Jemma (1916) announced that he had obtained a cure in 21 out of 26 cases in Naples, while Spagnolio (1916) recorded the successful treatment of 4 cases. The most extensive series of Italian cases consisted of 110, which were treated at Jemma's clinic in Naples, between October, 1913, and July, 1920, an account of which has been given by Javarone (1920) and Foti and Javarone (1921). This series evidently includes the 26 cases originally reported by Jemma. In all a diagnosis had been made by spleen puncture. The most noticeable feature of this series is the difference in the mortality-rate before and after the introduction of the tartar emetic treatment—whereas recovery had been the exception, it now became the rule. Of the 110 cases, 63 were treated by tartar emetic, with 49 recoveries and 14 deaths. A 1 per cent. solution of the drug was used, and was run into the vein from a graduated burette. For children aged 3 the first dose is 2 cc., and this is increased to 3, 4 and 5 cc. In older children the dose is 2 to 3 cc., increased to 6 or 7 cc. At least two clear days must elapse between each injection. The treatment must be continued for 40 or 50 days, during which 30–50 cgm. of the drug is given. The deaths were due in all cases to intercurrent maladies either during or after treatment. Some of those who died

were actually cured of the leishmania infection. As was to be expected, the mortality-rate was highest amongst the youngest children.

An attempt to treat 43 children in an out-patient department was described by LONGO (1917). The results were far from satisfactory owing to the unwillingness of the parents to submit their children to the prolonged course of treatment.

TREATMENT OF KALA AZAR BY TARTAR EMETIC.

Observer.	No. of Cases.	Diagnosed by discovery of parasite.	Cured.*	Improved (treatment in progress).	Spleen puncture negative after treatment.	No improvement, or treatment not completed.	Deaths.	Death, but leishmania infection apparently eradicated.
	INDIAN CASES.							
ROGERS, 1915	13	13	8	—	—	4	1	—
MUIR, 1915..	9	9	—	8	—	—	1	—
ROGERS & HUME, 1916	6	6	5	—	6	—	1	1
ROGERS, 1916	12	11	8	4	5	—	—	—
ROGERS, 1917	17	12	15	2	—	—	—	—
ROGERS, 1917	13	12	8	3	8	1	—	—
MUIR, 1917..	143	72	97	—	—	33	13	—
KNOWLES, 1920.. ..	86	86	46	11	31	7	22	2
MACKIE, 1915	1	1	1	—	—	—	—	—
GHOSH, 1916	4	4	4	—	—	—	—	—
JACKSON, 1916	1	1	1	—	—	—	—	—
LOW, 1919 ..	1	1	—	—	—	—	1	1
	MEDITERRANEAN CASES.							
DI CRISTINA & CARONIA, 1915.. ..	10	10	5	2	—	—	3	—
JEMMA, 1916	26	26	21	—	—	—	5	—
SPAGNOLIO, 1916.. ..	4	4	4	—	—	—	—	—
FOTI & JAVARONE, 1921	63	49	—	—	—	—	14	8

* The data are insufficient to admit of a precise statement of the period of observation after treatment.

It is quite clear that tartar emetic is just as specific in the treatment of the kala azar of the Mediterranean area as it is in India. The difficulties of carrying out continued intravenous medication in young children make it all the more desirable that some simpler method of administering antimony should be discovered. Furthermore, it has been shown that in some cases death has resulted from administration of tartar emetic. Some individuals react badly to the drug, so that it is necessary to commence with small doses and gradually work up to the maximum, a careful watch being kept on the patient after each injection. Shortly after a dose has been given a cough very frequently is developed. In other cases there may be definite rigors, rise of temperature, vomiting, and diarrhoea. Some patients complain of rheumatic pains and a general feeling of depression. It is most important, however, when once the course has been commenced to continue it till recovery has taken place, as pointed out by ROGERS, MUIR, KNOWLES, and others.

Other compounds of antimony.—Though it is generally admitted that the majority of cases of kala azar can be permanently cured by means of tartar emetic, the fact that injections of this drug are not entirely free from unpleasant consequences has led to the trial of other antimony derivatives.

Paraacetyl amidophenyl stibinate of sodium.—The introduction of this salt, which is known by the name *Stibacetin,* in the treatment of kala azar is due to CARONIA (1916). The drug, which was first prepared in Germany, is easily soluble in water, and contains about 33 per cent. of antimony.* The solution must be prepared fresh. It was tried by intramuscular injection in four cases in Italy. For children under two years of age an initial intramuscular injection of 3 cgm. was given, and was increased to 10 cgm. In older children the dose ranged from 5 to 15 cgm. The injections can be given every second day into each buttock alternately. Of the four cases a boy aged 3½ years had completely recovered after three months' treatment, during which he received 3·6 gm. of the drug; a girl aged 23 months was cured by 9 injections in the course of 16 days, and another aged 12 months by 6 injections in 10 days; in the latter case an abscess formed after an injection of 12·5 cgm.; the fourth case, a boy of 17 months, improved considerably, but died from an abscess in the lumbar region, which was present before treatment was commenced. The treatment of a single case, with favourable result, was reported by KHÀRINA-MARINUCCI (1916). Under the name of *Stibenyl,* which is said to be a closely allied compound, but which is undoubtedly *Stibacetin*, BRAHMACHARI (1921) reports the use of this drug in two cases. In one it was given intravenously, in the other intramuscularly. The doses varied from 0·1 to 0·3 gm. It is not known if a permanent cure was effected. MANSON-BAHR (1920 and 1921) had good results in one case by the intravenous method, while in another a dose of 0·4 gm. produced vomiting and diarrhoea, the patient ultimately dying of amoebic dysentery. Leishmania, proved by culture to be living, were still present in the organs at post-mortem examination. In spite of reports he has received of alarming symptoms following the use of this drug (undoubtedly an impure form of *Stibacetin*) in India, he still believes that this compound holds out better prospects for the treatment of kala azar than tartar emetic or the sodium salt. The experience on which this statement is made is, however, not very extensive.

FOTI and JAVARONE (1921), in Italy, used *Stibacetin* in 10 cases. Eight were treated by intramuscular injections and two intravenously. For intramuscular injections they commenced with a dose of 3 cgm. in

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* The following information has been kindly supplied by Dr. T. A. HENRY, of the Wellcome Chemical Research laboratories :—

Stibacetin—Sodium paraacetylaminophenylstibinate, $C_{24}H_{25}O_{10}N_2Sb_2Na$, contains theoretically 40·12 per cent. of antimony. The form of *Stibacetin* sold as *Stibenyl* in this country in May 1920 contained 34·85 per cent. of antimony, and that now on sale, which is advertised as Von Heyden's, contains 33·16 per cent. Two different batches contained 32·54 and 33·79 = mean 33·16. Sodium antimonyl tartrate, $C_4H_4O_7SbNa,\frac{1}{2}H_2O$, contains 38·06 per cent. of antimony, and the commercial salt as made for use in medicine is pure. Potassium antimonyl tartrate, $C_4H_4O_7SbK,\frac{1}{2}H_2O$, contains 36·14 per cent. of antimony, and the commercial salt is pure.

All the foregoing percentages are expressed as percentages of metallic antimony for the formulae as given, including water of crystallization where shown in the formulae.

the form of a solution (2 cgm. in 1 cc. of cold distilled water). The injections are given at intervals of two days, and the dose is increased to 10 cgm. The duration of treatment is longer than when the intravenous method is employed, but this disadvantage is compensated for by the ease of administration. The drug must not be given subcutaneously, as it causes necrosis. Of the 10 cases treated seven were cured and three died.

The number of cases treated with *Stibacetin*, all of which were properly diagnosed, cannot compare with the large number in which tartar emetic has been successfully employed, but it is evident that the drug has a similar action; and if it can be administered intramuscularly, we have at any rate a method of treatment which is more suitable for the handling of the disease in young children, in whom intravenous injections are difficult to carry out. So far, however, there is no evidence that it is more potent than tartar emetic.

Colloid antimony sulphide.—Brahmachari (1917) stated that he had tried colloidal sulphide of antimony, both intramuscularly and intravenously, in the treatment of kala azar. As the results were disappointing he discontinued its use. Rogers (1919) gave a more detailed account of the treatment of 10 cases of undoubted kala azar by means of this drug. The method of preparation is fully described. Doses up to 20 cc. of a solution slightly weaker than 1 in 500 were given repeatedly by the intravenous route without the least toxic symptoms. The results of this treatment were excellent, and the 10 cases, which received from 8 to 37 cgm. of the drug, were all cured. The advantages of this drug over tartar emetic are said to be its lower toxicity, the more rapid gain in weight of the patient, and the smaller quantity required to effect a cure. Rogers regards it as a distinct improvement on the soluble antimony tartrates in the treatment of kala azar.

Other compounds of antimony.—Brahmachari, who has experimented with a large number of antimony preparations, reports good results following the intravenous use of metallic antimony in suspension and colloidal metallic antimony. Of the former preparation he says it is the strongest preparation of antimony for the treatment of kala azar, being superior to any others that were tried before its use. Another drug used by this observer is hyper-acid antimonyl tartrate (+ urethane). The highest dose was 5 cc. of a 2 per cent. solution given intramuscularly. The use of this strength was not free from pain. A 1 per cent. solution, however, is almost painless. Of this drug he writes that it is one of the greatest advances in the treatment of kala azar. This investigator (1915 17) also reported the treatment of two cases of kala azar by intravenous injections of formaldehyde. The drug was said to act like a specific, but, curiously enough, he states that he has not been able to give it a further trial though we know from his publications that he has been conducting further investigations on the treatment of kala azar with other antimony derivatives, of which, in 1921, he has given an account. None of them has given results superior to those obtained with tartar emetic. It is evident, therefore, that though he has reported so very favourably on some of the drugs he has used, he is not satisfied with his own results, as he is still passing on to new compounds of antimony. In no instance reported has any of these drugs been used in a large enough series of cases to justify the deductions made as to their value; and it is to be regretted that before further experimentation with new derivatives, those so favourably judged have not been fully tested.

Animal Experiments.

One of the great hindrances to the satisfactory study of the method of spread of kala azar is the lack of an animal which is susceptible to the disease. It may safely be affirmed that if strains of leishmania were as readily inoculable to animals as are the pathogenic trypanosomes, our knowledge of the etiology of the disease would be considerably more advanced than it is at present. Both the Indian and Mediterranean viruses are inoculable to dogs, monkeys, rats and mice, but the infections are produced only after inoculation of large doses of virus, and then with no degree of certainty. When infection takes place it is of a chronic nature, and though parasites are sometimes numerous in the organs, at other times they are very scanty and difficult to detect. Recent investigations have done nothing in the way of solving this problem. It results, therefore, that it is very difficult to test the infectivity of any invertebrate host which may be suspected of transmitting the disease. Dogs and monkeys appear to be the most susceptible animals, and they have been infected with the virus obtained both from man and from naturally infected dogs. It is possible, by inoculating larger doses of virus from animal to animal, to maintain any particular strain. Laveran (1920) has shown that in the passage of a virus through mice the virulence gradually decreased. Mice, in some instances, were found to be infected two years after inoculation. Rats appear to be more difficult to infect than mice, and guinea-pigs and rabbits still more so. There is apparently no difference in the infections produced in animals by the Indian and Mediterranean viruses.

Interesting experiments with the virus of kala azar were made by Row (1912–13). By inoculating a monkey in the skin of the head by scarification with virus from the spleen of a case of kala azar, nodules were produced after an incubation of three to five months. In these leishmania were present and there was no sign of a general infection. Similar lesions were produced in another monkey by the subcutaneous injection of cultures. The material from one of these nodules injected into the skin reproduced the local lesion only, while a general infection was produced in those monkeys injected intraperitoneally. It thus appears that *Leishmania donovani* produces local cutaneous lesions or a general infection according to the method of inoculation. Korke (1914) repeated Row's experiments, with similar results. He found, however, that in some cases in which the local skin lesion had resulted from cutaneous inoculation there existed also a generalized infection, while in others only a generalized infection developed after inoculation in the skin. Infections are more readily produced in animals by injecting the virus from a man or other animal than by cultures of the organism.

Transmission.

The problem of the transmission of kala azar still requires solution. In the Mediterranean area it is supposed by Basile that the flea is the vector, but it must be admitted that no further proof of this is forthcoming. This observer claimed to have followed the development of *Leishmania donovani* in the flea, and to have successfully transmitted the disease from infected to healthy dogs by means of these insects. Several other observers recorded successful experiments of the same kind. On the other hand, certain investigators (Da Silva, 1913; Wenyon, 1914) failed entirely to obtain any

development in fleas and were unable to effect a transmission of the disease. The fact that fleas are very liable to have a flagellate infection of their own renders it difficult to trace the development of leishmania in these insects. Furthermore, it is not an easy matter to exclude an infection in a living dog, so that in the apparently positive transmission experiments it is always possible that the supposed healthy dogs had already a latent infection. In such experiments, in which it may take several months for an infection to reveal itself in the animals employed, the exclusion of other sources of infection during the experiment is almost impossible. In a recent paper BASILE (1920) reviews the present position of this subject and restates his views. He claims to be able to distinguish the natural flagellates of the flea from those which develop from the leishmania ingested. Moreover, he states that the developing leishmania eventually produce cysts in the hind gut of the flea, as does the natural flea flagellate, and that kala azar may be acquired not only by the flea inoculating leishmania at the time of biting, but by an individual ingesting the encysted forms passed in the faeces of the flea. These and other statements made by this author are highly speculative, and lack the necessary experimental proof. He brings forward no convincing evidence in favour of the flea transmission hypothesis, and no facts which would exclude the fallacies of his earlier experiments.

On the transmission of kala azar in India recent investigations have thrown little light. Numerous insects have been investigated, and of these the bed bug has claimed the most attention. It is well known that PATTON first demonstrated that in the stomach of the bug leishmania are able to develop to the flagellate stage and undergo a multiplication. It was claimed by other observers that this development did not prove that the bug was the true host, and that the development took place probably because the stomach of the bug was acting as a culture tube. This was borne out by the fact that other flagellates are able to undergo a temporary multiplication and development in the bug's stomach. CORNWALL and LA FRENAIS (1916) showed that the flagellate forms of *L. donovani* could survive for at least 29 days in the intestine of the bug. In a recent paper PATTON and RAO (1921) have investigated the persistence of leishmania in the gut of the bug by making cultures on NNN medium at intervals after feeding. From a bug which had fed on cultures of *L. donovani*, and had had no subsequent feed, a culture was obtained from the mid-gut on the thirty-first day, while from another bug a culture from the hind gut was made on the thirty-fourth day. A culture was obtained from the mid-gut of a bug which had fed on cultures 41 days before and had had subsequent feeds of blood. It is thus evident that the parasite of kala azar can survive for at least 41 days in the gut of the bug, and this fact might suggest that the bug is the host of the parasite. That this is not necessarily the case is proved by the experiments of PATTON, LA FRENAIS and RAO (1921), who found that *Leptomonas pulicis* and *Crithidia ctenocephali* of the flea and *Herpetomonas muscae domesticae* could also survive for many days in the bug, the latter flagellate for at least 45 days. The forms of the parasite which occur in the bug are similar to those which are found in cultures in NNN medium. CORNWALL and LA FRENAIS (1916) described a certain form of the parasite which occurred as the *"thick-tailed" flagellate*. It is a rounded body, 5μ to 6μ in diameter, and has a long flagellum four or five times as thick as that possessed by the ordinary form.

Further observations on the behaviour of *L. donovani* in bed bugs were made by Helen Adie (1921) in India. This observer fed bugs on spleen pulp from cases of kala azar. The appearances recorded occurred in certain bugs which had died after feeding, and had been left in saline solution in an incubator for a few days before being examined. In these bugs it was found that an active multiplication of the flagellates had taken place, and that this had occurred not only in the cavity of the gut, but also in the cells lining it. It is supposed that the flagellate, probably the thick-tailed form of Cornwall and La Frenais, enters the cell and becomes eventually a large multinucleated sphere, which segments into a number of daughter forms. This intracellular development is compared with the intracellular development of *Trypanosoma lewisi* which occurs in the cells of the flea's gut. It is unfortunate that satisfactory evidence of a similar development was not obtained in living healthy bugs, though large numbers were examined. It is impossible to resist the conclusion that this development was merely another form of culture which had taken place in the dead and degenerate cells. The figures purporting to depict the various stages of this development are far from satisfactory, so much so that in many cases it is impossible to recognize the bodies as leishmania at all. Those which are intended to show the multiplication of leishmania by schizogony can equally well be interpreted in another manner. They might even be stages of schizogony of some sporozoon ; and that other parasites might be present is borne out by the fact that nematode larvae are also depicted as occurring in these bugs. It may safely be accepted, therefore, that the bed bug hypothesis of the transmission of kala azar is still unproved.

Several observers claim to have observed leishmania in the faecal mucus of kala azar cases. Knowles (1920) examined mucus from such cases, and though he saw bodies having a certain resemblance to leishmania they were so atypical that he was quite unconvinced as to their leishmanial nature. The examination of ankylostomes and their larvae hatched from eggs from kala azar cases by this observer failed to throw any light on the problem. The method of transmission of kala azar is still a mystery. Archibald (1914), who succeeded in infecting a monkey by feeding it on kala azar spleen material has suggested that infection may be carried in water, but there is no evidence of this. It is possible, as Wenyon (1914) suggested, that the parasite of kala azar is an insect flagellate which normally passes directly from one insect to another, as do most of the purely insect forms, and that occasionally man is infected. If such were the case it would be unnecessary to suppose that the insect invariably infects itself from the vertebrate host, though it might do so. Cornwall and Menon (1918) suggested the possibility of kala azar being conveyed by the rupture of an infected bug on the excoriated skin.

Relation of Insect Flagellates to Leishmaniasis.

In 1913 Laveran and Franchini published an account of certain experiments they had conducted with *Leptomonas ctenocephali* of the dog flea, *Crithidia fasciculata* of *Anopheles maculipennis*, and *Crithidia melophagi* of the sheep ked. It was claimed that rats and mice could be infected with these flagellates by intraperitoneal inoculation. Furthermore, they stated that mice which were kept with infected fleas or had been fed on these insects became infected. Similar experiments were reported by Fantham and Porter (1914–16) in

the case of dogs, mice, birds, fish and amphibia. These investigations promised to throw a new light on the relationship of insect flagellates to vertebrates, and suggested that kala azar or oriental sore might be the result of infection of man with flagellates which had hitherto been regarded as peculiar to the invertebrates. Laveran and Franchini, in a series of papers, extended their observations to other flagellates, including those of the house fly, sand fly (*Phlebotomus*), and even Euphorbia plants. These observers claim that the inoculated animals develop an infection which bears a striking resemblance to those due to leishmania, in that leishmania forms of the parasite occur in the blood, spleen and liver, or other organs. Flagellate leptomonas forms also were found in the blood. These infections are said to be transferable by subinoculation to other animals, which in some cases were killed by the presence of the organisms. Many of the statements made by these authors are difficult to understand. The apparent ease with which the infections were produced in their experiments stands in marked contrast to the uniform failure of other observers. Furthermore, the experiments with the flagellate of the sheep ked, which is almost certainly the invertebrate stage of the sheep trypanosome, is described as producing an infection of the kala azar type rather than one which would be expected to arise from the inoculation of a trypanosome. In this connection the recent investigations of Hoare (1921) are of significance. This observer attempted to repeat some of the experiments above described. Though these were conducted with abundant material and with the greatest care, no single instance of an infection of a vertebrate by an invertebrate flagellate was demonstrable. In the light of these results the uniform and rapid successes above described are very difficult to explain, and it is doubtful whether they throw any light on the problem of the transmission of kala azar. The experiments of previous observers have been collected in tabular form by Hoare (1921), and readers who are interested in the details are referred to his paper.

Culture of Leishmania.

It is now known that *L. donovani* can be easily cultivated in the water of condensation which forms in the tubes of Nicolle's rabbit-blood-agar medium first described by Manceaux (1911), and generally known as the Novy, McNeal, Nicolle (NNN) medium. It was also shown by Nicolle and Manceaux (1911) that growth took place on the surface of the solid medium above the water of condensation. This medium has now been extensively used, and it has been abundantly proved that strains of leishmania can be maintained indefinitely by subcultures in it. Nicolle (1921) has stated that a strain of *L. donovani* has been thus grown for over ten years at Tunis, and that during this period it has been subcultured over 291 times.

Thomson J. G. and Sinton (1921) record the successful culture of *L. donovani* from the bone marrow of a case of kala azar 14 hours after death. The case, which has been referred to by Manson-Bahr, had received a course of injections of tartar emetic. Successful cultures have, however, been previously obtained at post-mortems as late after death as 36 hours.

Prophylaxis.

As we have no definite knowledge of the etiology of kala azar it is evident that any prophylactic measures must, of necessity, be of an empirical nature. As Basile and other Italian observers believe

that the canine disease of the Mediterranean area is identical with that occurring in children and that the flea is the agent of transmission, the removal of dogs from close association with human beings and the destruction of possibly infected dogs have been advocated as a means of prevention. Basile (1916) records that in Bordonero in Sicily, where both the human and canine diseases were common, most of the infected dogs were destroyed. In the following year there were no fresh cases in children, and in the year after only one, though in that in which the dogs were killed there had been seven new cases in a population of 2,000.

In India prophylactic measures have been based on the known fact that kala azar is a house and family disease. Knowles (1920) gives some very instructive instances, in which several members of one family were found suffering from the disease. The following groups are recorded :—Mother and nine brothers ; father, sister and three brothers ; wife, daughter, sister and one brother ; mother and two brothers ; two brothers and sister-in-law.

In 1914, Dodds Price and Rogers published an account of the uniform success of segregation measures in eradicating kala azar from Assam Tea Gardens. On one estate new coolie lines were erected 300 yards distant from the old lines. Of 240 persons, 96 who had no cases of kala azar in their families were removed to the new lines. The new lines were filled up with new coolies to the extent of 800. This transference was carried out in 1897 and sixteen years later the new lines were still free from the disease, while the coolies in the old lines had died during the following few years. Kala azar, furthermore, spread from the old lines to a contiguous line, in which 60 healthy coolies were housed. One-third of these died during the next fifteen months and all the rest succumbed or left the estate during the few succeeding years. Other illustrative examples are quoted in the same paper in support of house infection as an important factor in the spread of the disease.

McCombie Young (1920) describes the measures which are being adopted in Assam to cope with the spread of kala azar. Known endemic areas are annually inspected, and when a village shows a large number of cases the disease is considered as hyper-endemic and the population is removed to a new locality,the definitely infected, the contacts, and the uninfected individuals being segregated separately. In the case of areas which show infections for the first time more radical measures are adopted. The population of every village which shows even a single case is removed to a new site. It is too early to speak of the results of these radical measures.

McCombie Young points out that the newly introduced treatment by tartar emetic promises to facilitate the eradication of the disease. It is becoming widely known, and its success appreciated by the native population.

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ON THREE SUPPOSED NEW ENTAMOEBAE OF MAN: A REVIEW.

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In the first of the papers the title of which appears below* Chatterjee describes a case of amoebic dysentery due to an amoeba for which he establishes the new species *Entamoeba paradysenteria*. The lesions, which were seen three hours after death, included ulceration of the large intestine of typical amoebic character, and also, what is unusual in such infections, an ulceration of the lower part of the small intestine. In addition, perforation of the large intestine had taken place, with the formation of a localized abscess. Another feature was that opposite the ulcers of the large and small intestine the peritoneal surface was raised into thickened red patches, in scrapings of which active amoebae were found. They were also observed in the abscess pus. When the amoebae were first seen they were thought to be *E. histolytica*, but it was noted that they varied very much in size and some were vacuolated. It was only in sections and stained films that the author was led to doubt his original identification. The amoeba is said to differ from *E. histolytica* in that even in the non-motile stage there is a very marked distinction between ectoplasm and endoplasm. In some cases bacteria were seen in the endoplasm as well as red blood corpuscles, while "chromidia blocks," which the author says are commonly found in *E. histolytica*, were not seen. Most of the amoebae varied in size from 16 to 20 microns. Some were as large as 40 microns, and others as small as 8 microns. The nucleus differed markedly from the typical one of *E. histolytica*. It is situated eccentrically and is usually oval in shape. There is no differentiation into central and peripheral chromatin, and while a nuclear membrane was not easily distinguished, it is stated that no karyosome was present, though immediately after the nucleus is described as being of the "limax" type, the most characteristic feature of which is the presence of a large central karyosome. The amoeba is depicted in a series of plates, but the figures of the nuclei do not correspond with the text description. Some of the nuclei figured have definite membranes on which granules of chromatin are shown, while the central parts are occupied by diffusely stained areas. Other nuclei are evidently swollen and degenerate.

The two main characters which are supposed to distinguish this amoeba are the marked development of the ectoplasm and the peculiar structure of the nucleus. The author is correct in stating that the typical *E. histolytica* does not possess these features, and in this respect is justified in the title of his paper, but it is perfectly clear from the

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*1. Chatterjee (Gopal Chandra). An Atypical Amoeba causing Dysenteric Lesions.—*Philippine Jl. Sci.* 1920. Oct. Vol. 17. No. 4. pp. 385–394. With 3 coloured plates.

2. Tibaldi (Ettore). Sopra una nuova specie di ameba parassita trovata nelle tonsille.—*Ann. d'Igiene.* 1920. Oct. Vol. 30. No. 10. pp. 613–621. With 1 coloured plate.

3. Kofoid (Charles Atwood) & Swezy (Olive). On the Free, Encysted, and Budding Stages of *Councilmania lafleuri*, a Parasitic Amoeba of the Human Intestine.—*Univ. California Public. Zool.* 1921. June 23. Vol. 20. No. 7. pp. 169–198. With 5 plates and 3 text figs.

figures he has produced that he is dealing with degenerating amoebae. The excessive development of the ectoplasm is a common feature of *E. histolytica* under abnormal conditions, while the peculiarity of the nuclei is easily accounted for in this manner. The material was obtained post-mortem three hours after death, during which important changes could readily have taken place in the structure of the amoebae. The fact that they were still active does not exclude this possibility, for very active *E. histolytica* often show striking abnormalities, while the rate of degeneration of amoebae in the body after death varies considerably from case to case. That a degenerative process was in progress is borne out by the fact that certain of the amoebae were invaded by bacteria. The appearances described by the author are perfectly familiar to the writer of this review, who is convinced that the supposed *Entamoeba paradysenteria* is nothing more than an abnormal and degenerate *Entamoeba histolytica*.

2. The second of the above papers, by TIBALDI, describes as *Entamoeba macrohyalina* an amoeba which he found in two cases of tonsillitis. In three other cases of tonsillitis he found only the well-known *E. gingivalis*, which occurs commonly in the material from carious teeth. Both these amoebae are illustrated in a coloured plate. The figures of *E. gingivalis*, though recognizable as such, do not depict the amoeba accurately, especially as regards the nuclei. It is evident that the method of preparation of the films was not a reliable one.

The chief features which distinguish the amoeba, which the author calls *E. macrohyalina*, from *E. gingivalis* are the presence of a marked ectoplasm and the large size, the amoebae measuring from 24 to 40 microns in diameter, instead of 10 to 25 microns. In the figures given by the author the nuclei of the two amoebae differ considerably, but it is evident that the appearances do not give an accurate idea of their true structure. It may be gathered, however, that the amoebae differ from the ordinary forms of *E. gingivalis*, but that *E. gingivalis* can never assume such a form no evidence has been produced. The typical *E. histolytica*, when perfectly fresh, has only a narrow ectoplasm, but owing to degenerative changes the ectoplasm very quickly increases in thickness. It is possible that such a change may take place in *E. gingivalis*, in which case it would assume the characters of *E. macrohyalina*. It is also conceivable, though unlikely, that *E. histolytica* itself might invade the tonsil, and the figures of *E. macrohyalina* might pass for badly fixed specimens of this amoeba. Though the author has drawn attention to an amoeba which differs as regards size and development of ectoplasm from *E. gingivalis* as usually seen, he has produced no evidence that he was not dealing with an altered form of the common amoeba of the mouth. On this account it is entirely premature to create a new species.

3. In the third paper KOFOID and SWEZY describe as *Councilmania lafleuri* a new amoeba of the human intestine. They give a very detailed description, which is well illustrated by five plates in black and white. The new amoeba, according to these authors, has hitherto been confused with *E. coli*, primarily because it also produces an eight-nucleated cyst.

The life-history of the parasite may be thus outlined. As seen in the living condition, it is a very active organism when compared with *E. coli*, and has a well-developed ectoplasm. It forms pseudopodia of ectoplasm with the rapidity and suddenness of *E. histolytica*, and like this species it ingests red blood corpuscles. As binucleated forms occur, presumably multiplication by binary fission may take place. The

method of reproduction, which is the chief characteristic of this amoeba, is by a remarkable process of bud formation from the cyst. The encysted forms, like *E. coli*, develop eight nuclei, but the cyst wall is thicker, so that staining is difficult. Within the cyst there occur chromatoid bodies, while the nuclei tend to collect at the centre. It is stated that the nuclei on division have six chromosomes instead of the eight that *E. coli* is said to possess. A large glycogenic vacuole is present in the early stages, and this is said to be relatively "resistant to iodine." In the later stages the chromatoid bodies appear to give rise to a band called the "chromophile ridge." This structure is supposed to take some part in the formation of the buds. When budding is to take place a pore is formed in the cyst, to which the chromophile ridge is applied. Through this pore, near which the eight nuclei collect, a bud or hernia of cytoplasm is protruded. Into it one of the nuclei passes, and it is then nipped off as a small amoeba. By repeated budding processes all the nuclei are used up to form eight small amoebae. The whole of this process is stated to take place in the one host.

The amoeba thus described has some of the characters of *E. coli*. Without transference to a new host, however, it produces eight small amoebae by a budding-process through a pore in its wall. It is recognized by the authors that these amoebae and cysts have been seen by other observers, but they think that they have been erroneously included in the species *E. coli*.

It is generally known that *E. coli* produces an eight-nucleated cyst, which is transferred to a new host, where escape from the cyst takes place either as a single eight-nucleated body or as eight small amoebae. Exactly what happens is not known, though Casagrandi and Barbagallo from their experiments on cats, give a figure of the escape of the amoebae from the cyst which bears some resemblance to the figures of Kofoid and Swezy, as indeed they recognize. They have produced, however, no evidence that the escape of the supposed new amoeba from the cyst is different from that of *E. coli* from its cyst. The only variation is that they claim that the process takes place in the host in which the cysts are produced instead of in the next host. They draw attention to a figure of the cyst of *E. muris* of the mouse published by the reviewer in 1907, who thought at the time that this might be a developmental process, but now realizes that he was dealing with a ruptured cyst. It seems abundantly evident, therefore, that there are no grounds for the creation of the new genus *Councilmania;* the amoeba, whatever may be its specific name, undoubtedly belongs to the genus *Entamoeba*.

As regards the specific characters of this amoeba, there are several points which require further elucidation. The fact that certain forms ingest red blood corpuscles is readily explained on the assumption that a double infection with *E. histolytica* occurred in some of the cases. The authors do not produce sufficient evidence to exclude such a possibility. The nucleus is certainly different from that of the typical *E. coli* or *E. histolytica*, but it is well known, though perhaps not sufficiently recognized, that both these amoebae frequently show nuclei which are far from typical. The reviewer has often seen the appearances here depicted in undoubted *E. coli* or *E. histolytica*. The assertion that the new amoeba has eight chromosomes during nuclear division, whereas *E. coli* has only six, comes as a surprise to the reviewer, who was under the impression that no definite chromosomes are formed during the division of the nucleus of *E. coli*. Such stages of the division of the nucleus of *E. coli* as he has seen give no indication of chromosome

formation, and this is borne out by DOBELL's detailed description of the division of the nucleus of *E. histolytica*, which is of a similar type.

When the peculiar method of budding is considered the most striking fact is that the process is an entirely new one. The reviewer is not aware that it has been described for any other protozoon. This does not, of course, exclude the possibility of its occurrence, but makes one hesitate to accept it unless every other possible explanation has been excluded. In the very numerous observations the reviewer has made on cysts of *E. coli* he has noted on many occasions that in saline preparations it is quite easy to rupture the cysts of *E. coli* between the slide and cover-glass. In such cases the cytoplasm protrudes as a hernia, and this may contain a single nucleus, while the other nuclei are congregated about the opening in exactly the manner described by KOFOID and SWEZY for their new amoeba and depicted in their figs. 22 and 27. The chromophile ridge on which they lay so much stress appears to be in some cases nothing more than a fold or crease of the inner membrane of the cyst, which is readily seen in ruptured cysts of *E. coli*. In others it possibly represents chromatoid bodies. The ridge is described as being associated with the pore, and from the explanation just given this is exactly what would be expected. The crease in the membrane would commence where the rupture of the cyst had taken place. The pore through which the buds are supposed to be formed is depicted as being already present in the four-nucleated stage (fig. 25). The authors have considered the possibility of the appearance being produced by a rupture of the cyst, but they put this aside with the statement that "it is not due to trauma and cannot be produced by pressure." From the observations on cysts of *E. coli* mentioned above the reviewer is in a position to state that appearances of the same kind can certainly be produced by artificial rupture of the cyst of *E. coli*. KOFOID and SWEZY claim that the process of bud formation has been watched in living specimens, but it is significant that they state that they have not yet been able to watch the detachment of the amoebulae, though in one instance cytolysis of the bud was observed to take place.

In spite of the fact that eleven cases of infection with this amoeba are said to have been seen, the reviewer is unable to resist the conviction that the amoeba is none other than *Entamoeba coli*, and that the supposed budding process is an accident resulting from a rupture of the cyst and a gradual expulsion of cytoplasm through the opening. It seems highly probable that MATHIS and MERCIER (1917), in their description of the escape of amoebulae from the cysts of *E. coli*, were observing similarly damaged cysts [this *Bulletin*, vol. 10, p. 130]. It would be quite impossible in ordinary work to distinguish either the vegetative stages or the cysts of the supposed *Councilmania lafleuri* from those of *E. coli*, and it can serve no practical nor scientific purpose to regard the forms described as belonging to a distinct species. This being so, there is no alternative but to add the name *Councilmania lafleuri* to the long list of synonyms which *Entamoeba coli* already possesses.

There is one other striking assertion in this paper which requires very careful consideration. It is said that a case of human infection with *Entamoeba muris* of the rat has been seen. The reviewer, who has frequently studied this parasite during the past fifteen years, knows of no method of distinguishing the amoeba of the rat from *E. coli* of man. On the other hand it might very legitimately be argued that the two are identical, so that the reviewer is at a loss to understand how the diagnosis of *E. muris* was made for an amoeba of the human intestine.

AMOEBIASIS AND DYSENTERY.

Amoebiasis.

Thomson (John Gordon) & Robertson (Andrew). **The Value of Laboratory Reports on Stools in Cases of Suspected Amoebic Dysentery, and their Interpretation by the Clinician; with a Special Note on the Diagnostic Significance of Charcot-Leyden Crystals.**—*Proc. Roy. Soc. Med.* (Sect. of Trop. Dis. & Parasit.). 1921. Vol. 14. pp. 33–44. With 4 figs.

From March to September 1920, 999 stools from 207 patients in the Hospital for Tropical Diseases, London, were examined by the authors of this paper, of which 32 cases were definitely diagnosed as amoebic dysentery. The number of amoebic cases with Charcot-Leyden crystals in their stools was 8, or 25 per cent. These are most common in the stools of long-standing infection with *Entamoeba histolytica*; their number varies immensely, and does not appear to have any relation to the severity of the disease; the greatest number are found in proximity to an amoebic ulcer, and may best be demonstrated by means of the sigmoidoscope. On two occasions the crystals were observed within the endoplasm of an active *Entamoeba histolytica*. They may result from the cytolysis of eosinophil leucocytes, or they may be an excretion of the entamoeba itself.

They are never found in dysentery of bacillary origin, and the authors agree with Acton that they are not found in entozoal infections of man in which the presence of *E. histolytica* has been excluded.

Two cases are cited in which numerous systematic examinations of the faeces failed to reveal the entamoeba, but on the ninth occasion active organisms were found; the stool itself contained these crystals in numbers all the time. The authors conclude that Charcot-Leyden crystals in human stools are diagnostic of amoebic colitis.

P. H. Manson-Bahr.

Thomson (John Gordon) & Robertson (Andrew). **Charcot-Leyden Crystals in the Stools as an Aid to the Diagnosis of Entamoebic Dysentery.**—*Jl. Trop. Med. & Hyg.* 1921. Nov. 15. Vol. 24. No. 22. pp. 289–292. With 2 plates.

In the experience of the authors of this paper the Charcot-Leyden crystals are frequently associated with entamoebic dysentery, and the proportion of cases showing them in the stools is greater than the 20·4 per cent. quoted by Acton.

In one case they were present in an infection with *Isospora hominis*, but a further search revealed an entamoeba of undetermined species as well. The largest number of crystals were seen in scrapings of amoebic ulcers obtained through the sigmoidoscope; in these specimens the crystals are arranged in clumps. In formed stools the crystals may constitute the only sign of amoebiasis. There is considerable variation in their size; they may reach 70μ in length; the average is between 5μ and 25μ. In shape they are typically like a whetstone. Soluble in warm water, acetic acid, strong mineral acids and alkalis, they are insoluble in cold water, alcohol, ether, glycerine, xylol and chloroform.

The exact chemical composition of these crystals is unknown; it is suggested that they may be the product of some secretion of the entamoeba, either by itself or in combination with some mucilaginous substance. The diagnosis of amoebic dysentery is difficult; it is therefore the authors' contention that, while persistent efforts should be made by protozoologists to find the entamoeba, Charcot-Leyden

crystals, which are found in from 20 to 25 per cent. of cases of amoebiasis and have not been found in any other condition (from which possible amoebiasis has been excluded), may supply evidence sufficient to ensure treatment on the right lines by the clinician.

P. H. M-B.

Ravaut (Paul) & Charpin. **L'amibiase en France pendant la guerre.**— *Jl. Méd. franç.* 1919. Apr. [Summarized in *Bull. Inst. Pasteur.* 1921. May 15. Vol. 19. No. 9. pp. 318–319.]

The authors have investigated the question of amoebiasis in France; the statistics collected at Marseilles showed :—

19·5 per cent. of sick evacuated from the Orient were infected.
25 per cent. of colonial troops.
15 per cent. of medical cases from the French front.
27·3 per cent. of medical cases from the interior.

The last figure is a remarkably high one, but the authors remark that the environs of Marseilles and Toulon are the regions most liable to importation of amoebic cases from abroad.

The majority of the clinical amoebic cases in France are of a mild nature.

P. H. M-B.

Scott (Henry Harold). **A Study of the Sizes of** *Entamoeba histolytica* **Cysts amongst Symptomless Carriers in Jamaica.**— *Ann. Trop. Med. & Parasit.* 1921. July 16. Vol. 15. No. 2. pp. 133–148. With 25 text figs.

This paper gives in much detail the results of large series of measurements of *E. histolytica* cysts from ten hospital cases admitted for

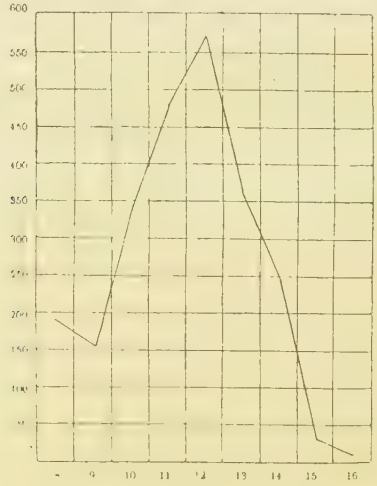


Fig. 25. Showing size of *E. histolytica* cysts (2,389). The curve is drawn up giving the numbers of cysts found within certain intervals of a complete 1μ. It is bimodal, the modes occurring between 7μ and 8μ and between 11μ and 12μ. (Reproduced by permission from the *Annals of Tropical Medicine and Parasitology.*)

complaints not connected with the bowels. The results in each individual case are graphically represented, and a curve showing the range of size in the aggregate of 2,389 cysts is also given. This final curve is bimodal between 7μ and 8μ and between 11μ and 12μ. The details of certain cases, where the number of cysts was large and frequent examinations were made, do *not* support the proposition that "the mean diameter of cysts from any patient is not subject to any considerable variation from day to day, but remains constant." On the contrary, among the cases here carefully recorded are some showing, in the course of consecutive examinations extending over a term of some duration, a gradual change from small to ordinary cysts and vice versa. It is not possible to summarize further a paper so largely statistical.

A. Alcock.

Scott (Henry Harold). **A Study of the Sizes of *Entamoeba coli* Cysts amongst Symptomless Carriers in Jamaica.**—*Ann. Trop. Med. & Parasit.* 1921. July 16. Vol. 15. No. 2. pp. 149–160. With 23 text figs.

Results of a series of measurements of *Entamoeba coli* cysts from six hospital cases admitted for complaints not connected with the bowel. The individual cases are considered and graphically presented separately. The graph of the aggregate of 2,500 cysts is bimodal, both modes being at a high level, namely, 17μ to 18μ and 19μ to 20μ.

A. A.

Cauchemez (L.). **Fréquence des amibes iodophiles chez le porc, en France.**—*Bull. Soc. Path. Exot.* 1921. June 8. Vol. 14. No. 6. pp. 321–322. With 1 text fig.

In a verbal communication here published Brumpt expresses the opinion that the iodophil amoeba discovered by Wenyon, and identified by Brug with Prowazek's *Entamoeba williamsi* and by Dobell with *E. bütschlii* of Prowazek, is not amenable to the jurisdiction averred, but should be known as *Iodamoeba wenyoni*, Brumpt.

With regard to O'Connor's discovery of this species in pigs at Funafuti, the author now records its frequent occurrence in pigs in France, so much so that he inclines to think that, like *Balantidium coli*, it may be looked upon as a habitual parasite of the pig.

A. A.

Fischer (Walther). **Ueber Darmamöben und Amöbenruhr in Deutschland.**—[Intestinal Amoebae and Amoebic Dysentery in Germany.] *Berlin Klin. Woch.* 1920. Jan. 5. Vol. 57. No. 1. pp. 7–10.

Systematic faeces examinations carried out on 120 patients during the war have proved that autochthonous cases of amoebiasis occur in Germany. In doubtful cases concentration methods and staining of faecal films were resorted to. Infection with *Entamoeba histolytica* was found twice and with *Entamoeba coli* eleven times.

The first case was that of a girl of 18 who had suffered for eighteen months past from diarrhoea; typical "vegetative" entamoebae with ingested red blood corpuscles were found. The second was that of

a young soldier who had contracted dysentery on Lake Narotsch. Diarrhoea and tenesmus persisted; both cysts and active amoebae were found.

P. H. M-B.

VAN DER HOEVEN (J.). **Een geval van lever-absces na inheemsche amoeben-besmetting.** [An Indigenous Case of Amoebic Abscess of the Liver (Holland).]—*Nederl. Tijdschr. v. Geneesk.* 1921. May. Vol. 65. 1st half-year. No. 22. pp. 2940–2942.

This is an interesting description of an indigenous case of amoebic abscess of the liver in a native of Holland.

The patient was a married woman, aged 39, who had never been out of Holland. She was admitted to the hospital at Zutphen (Gelderland) at the beginning of October, 1920, having then been ill for some two months. On admission she had a temperature of 39° C., a weak and rapid pulse (110 per min.), an enlarged and painful liver, scanty urine, and oedema of the abdominal wall, lumbar region, feet, and legs. Some two months previously the patient had been treated for pyelitis, and at that time had abdominal pains, an enlarged liver, and loose stools.

Abscess of the liver was diagnosed, and two days after admission an operation was performed. A large abscess (site not stated) was found, and a quantity of thinnish, turbid, and reddish pus—estimated at "one or two litres"—was evacuated. The cavity of the abscess was washed out subsequently with a 0·2 per cent. solution of emetine hydrochloride, and hypodermic injections of the same drug (30 mgm. daily for 11 days) were administered. The patient made an uneventful recovery, and was discharged as cured at the end of November.

Microscopic examination of the pus from the abscess revealed blood corpuscles, cellular débris, and amoebae. These were motile, with hyaline and distinctly differentiated ectoplasm and an eccentric nucleus, and sometimes contained ingested red corpuscles. Their finer cytological details are not described, and their size was not, apparently, determined accurately ("under a magnification of 200 diameters they looked about as big as ten-cent pieces"*). These amoebae were identified as *Entamoeba histolytica* (or *E. dysenteriae*), and it is stated that "*minuta*" forms of the same species were found in the abscess pus and also in the patient's urine.

[It is unfortunate that no microscopic examinations of the patient's stools appear to have been made, and the discovery of "amoebae" in the urine—far from supporting the diagnosis—tends to throw doubt upon what is otherwise an apparently authentic indigenous case of amoebic abscess of the liver. The "*minuta* amoebae" observed in the urine are described as "peculiar, round, refractile, large cells," and it is stated that they were first found and interpreted as amoebae by Dr. BLOK of Zutphen. The reviewer has had an opportunity, through the courtesy of this gentleman, of studying some of these structures, and is convinced that such an interpretation was not warranted. Apart from these highly questionable urinary "amoebae," however, he sees no reason to question the correctness of the diagnosis in the present case. It is now known that *E. histolytica* occurs indigenously in Holland—see this *Bulletin*, Vol. 17, p. 3—and consequently the sporadic occurrence of cases of amoebic liver-abscess is to be expected.]

Clifford Dobell.

* A silver coin a little smaller than a threepenny-bit.

Jones (D. W. Carmalt). **A Case of Amoebic Dysentery contracted in New Zealand.**—*New Zealand Med. Jl.* 1921. Oct. Vol. 20. No. 99. pp. 259–260.

A healthy man aged 36 went into a military camp in 1916 for training. The weather was very hot, and after a week he reported sick with diarrhoea and vomiting. Since that date diarrhoeic attacks have occurred every month. On microscopic examination the stools contained much blood-stained mucus and numerous active entamoebae. The evidence for the claim made in the title appears to be fairly conclusive.

P. H. M-B.

Paranhos (Ulysses) & Reis (Paiva). **Formas atypicas da amibiase intestinal.**—*Brazil Medico.* 1921. Aug. 6. Year 35. Vol. 2. No. 4. pp. 37–39.

In view of the fairly frequent occurrence of clinically atypical amoebiasis the author urges the importance of a routine examination of faeces in cases presenting intestinal symptoms. Clinical histories are given of five such cases where symptomatic treatment having failed completely, an examination of faeces revealed amoebae or their cysts or both. Emetine treatment effected a complete cure in three of the cases; in another the patient's condition was so much improved that he ceased to visit the physician; while in the fifth the result is unknown, as the patient resumed an interrupted journey immediately after the commencement of treatment.

F. S. Arnold.

Brown (R.). **Amebic Abscess of Liver with Pulmonary Sequels.**—*California State Jl. of Med.* San Francisco. 1921. July. Vol. 19. No. 7. p. 282. [Summarized in *Jl. Amer. Med. Assoc.* 1921. Aug. 13. Vol. 77. No. 7. p. 574.]

The patient suffered from prolonged subacute dysentery during which he coughed up pus. Physical examination of the chest aided by X-rays revealed an abscess of the right lung continuous with an abscess of the liver. The necropsy confirmed the provisional diagnosis and showed that the lung tissue in the lower three-fourths of the right lower lobe had been destroyed, a large pulmonary cavity lying immediately beneath the pleura; in the left lower lobe a similar cavity was found. No opening in the diaphragm connecting the liver and lung abscesses was apparent; it is possible that the diffusion of the amoebae from the liver to the lung took place through the circulation. The existence of an abscess cavity in the left lung was not noticed on X-ray examination, but a subsequent and more minute examination of the plates showed that a faint shadow was present there.

P. H. M-B.

Chatton (Edouard). **L'amibiase intestinale expérimentale du cobaye à *Entamoeba dysenteriae*. Ses caractères spéciaux; localisation caecale; absence de dysenterie; importantes réactions hyperplasiques.**—*Arch. Inst. Pasteur de Tunis.* 1918. Mar. Vol. 10. No. 3. pp. 138–157. With 2 plates and 3 text figs.

Few animals are susceptible to infection by human entamoebae. Amoebic lesions have been observed under natural conditions in the badger, sewer-rats (Lynch) and various monkeys. Under experimental

conditions the disease has been reproduced in the cat and dog ; the rat is particularly refractory. Previous workers had been unsuccessful in reproducing the disease in guinea-pigs, but Chatton was fortunate in producing infection in one case by feeding the animal on cyst-containing human faeces.

Emaciation was the only marked symptom the animal exhibited during life, though at autopsy the caecum especially showed infiltrations of the submucosa, alternating with transparent patches. The small intestine, save for a slight hyperaemia of the mucosa, appeared quite normal. The entamoebae obtained from scrapings of the lesions when stained by the iron-haematoxylin method showed in every detail the typical structure of *Entamoeba histolytica*.

Several further attempts at experimental infection of other guinea-pigs were made, and were successful in one other instance ; this animal was injected per rectum with a saline emulsion of scrapings of the caecal mucosa of guinea-pig no. 1. The incubation period of the disease was in the first instance 20 days, in the second 9 days. Chatton considers that further successful infections in this animal will be obtained by cyst-feeding *per os*. The possible source of error in making further experiments on these lines lies in the fact that the guinea-pig is parasitized by an entamoeba (*Entamoeba caviae* of Walker) which is of the *coli* type, but the author is quite certain, and in this he is supported by Nicolle, that no amoebic lesions resembling those described above have ever been seen in normal guinea-pigs at autopsy.

Histological studies revealed considerable differences from those commonly observed in human or cat amoebiasis. To the necrotic and inflammatory changes in the submucosa, so commonly observed, are superadded a curious hyperplasia, especially of the fundi of Lieberkühn's follicles, together with a very considerable exfoliation of the columnar epithelium. The invasion of the submucosa by the entamoebae takes place through the dilated fundi of Lieberkühn's follicles, for here they are to be found in greatest numbers. The ramifications of these glands, almost oedematous in appearance, extend through the muscularis into the submucosa. In fact the changes in the submucosa are strongly reminiscent of a neoplasm ; new blood-vessels are formed surrounded by neoplastic cells. This histo-pathological picture Chatton would describe as a sarcomatous hyperplasia.

A study of these early lesions certainly supports the theory that the entamoebae, attracted by the mucus-secreting cells, enter the crypts and attack the culs-de-sac of the glands where the mucus-laden cells predominate, and it is at this point they break through the muscularis and enter the submucosa ; the hyperplasic reaction would appear to result as a response to some secretion emanating from the entamoebae.

The main result of this study, the author considers, is the support it affords to the parasitic theory of neoplasms.

P. H. M-B.

Finochietto (Enrique) & Vaccarezza (Raúl F.). **Tumor inflamatorio del intestino grueso de origen amibiano.** [Inflammatory Tumour of the Large Intestine, Amoebic in Origin. —Reprinted from *La Prensa Medica Argentina*. 1920. Oct. 20. 23 pp. With 6 text figs.

Amoebiasis is not the least important of possible causes of an inflammatory tumour of the large intestine. One may suppose that

inflammatory tumours described by other South American writers were amoebic in origin, especially those cases in which there has been more or less chronic colo-rectitis or in which ulcerative colitis was found at autopsy. The following case came within the writers' experience.

At the age of 25 the patient was in bed for a week with fever and bilious vomiting. A month later the fever returned and was accompanied by intense and continuous pain in the left hypochondrium, with swelling in the same region. This illness was followed by attacks of diarrhoea in which the patient had four or five mucous blood-stained stools and sometimes a frank haemorrhage. After seven or eight months of this he came for treatment, complaining of a tumour in the right side. On examination this was found to occupy the whole of the right iliac fossa, extending upwards to the costal margin and across to the middle line. Blood examination showed: red cells, 4,500,000; leucocytes, 10,300. An examination of faeces for amoebae was negative. Bismuth meal and enema showed an irregular constriction of the caecum and ascending colon. Laparotomy revealed a tumour adherent to the lower border of the liver and the stomach. It included the ascending colon and caecum. The whole of this portion of the gut was removed, ileo-transversostomy performed, and the abdomen closed. The patient recovered from this operation without incident. However, the patient complained two years later that his symptoms remained as before the operation. By a rectoscopic examination the rectal mucosa was seen to be hyperaemic and covered with numerous and typical dysenteric ulcerations. *Entamoeba histolytica* and *Chilomastix* (*Tetramitus*) *mesnili* were found in the stools. After three injections of emetine the patient refused further treatment. He returned later and was treated daily with three keratinized capsules of double iodide of bismuth and emetine (Allen & Hanbury) and 1 per cent. iodine enemas. This treatment, continued over a period of more than one year, resulted in an apparent cure.

The tumour, with the ascending colon, the caecum, and a part of the transverse colon, were examined three years after fixation in formol. At that time the tumor was 12 cm. high by 10 broad. On section it had a lardaceous appearance. The three layers of the colon were recognizable in places, apparently not much thickened. The subserous cellular tissue was, however, much infiltrated, and formed a thick envelope to the colon. There was some haemorrhage into the mucosa, but no visible ulceration. Microscopically the tumour had the appearance of granulation tissue. Section of the wall of the colon showed superficial ulceration of the mucosa, leucocytic infiltration of the submucosa and muscular walls. The vessels showed various stages of obliterative endarteritis. There was no histological or clinical evidence to suggest that this tumour was due to tuberculosis, syphilis, or to a mycosis.

Is the amoeba alone the cause of this inflammatory tumour, or is it due to the existence of a secondary infection imposed on the dysenteric ulceration? The writers are not prepared categorically to inculpate the entamoeba, but they consider as suggestive the experiments of Chatton (see above), who has shown that dysentery in the guinea-pig is confined to the caecum and is associated with hyperplasia of the mucosa.

J. Rosslyn Earp.

Jepps (Margaret W.). **Notes on Treatment with Emetine at the University War Hospital, Southampton.**— *Jl. Roy. Army Med. Corps.* 1921. June. Vol. 36. No. 6. pp. 443–451.

Salol-coated pills of emetine bismuthous iodide proved unsatisfactory, for 45·1 per cent. at least out of a series of 26 cases relapsed after a 12-day course of 36 gr. An emulsion of EBI in liquid paraffin gave much better results, for only 12·7 per cent. out of a series of 63 cases relapsed after a similar course. No less than 11·1 per cent. were still uncured after re-treatment with a double course. Injections of emetine hydrochloride were found useful in cases which could not tolerate EBI; three out of five cases were cured by a course of 12 daily injections of 1 gr. each. This treatment benefited the general condition of the patient, and there were no permanent ill effects. It appears that objections to liquid paraffin as an excipient for EBI are ill-founded. The emulsion contains 3 gr. of EBI to the half-ounce of liquid paraffin. A dose ($\frac{1}{2}$-oz.) is easily taken if dropped into a glass containing two to three ounces of water; the emulsion floats and is readily swallowed. The proportion of relapses in EBI cases treated in this manner is very much less than with salol-coated pills. In the whole series of EBI-treated cases (75), the course had only to be stopped on account of untoward symptoms in 10 instances.

P. H. M-B.

Vaccarezza (Raúl F.). **Algunas consideraciones sobre el tratamiento de la amibosis intestinal y la posología del clorhidrato de emetina.** – Reprinted from *La Semana Médica.* 1921. No. 5. 16 pp.

Common mistakes in the administration of emetine hydrochloride for amoebiasis are (1) to use too small doses, such as were prescribed by Rogers in his first therapeutic experiments with this drug, and (2) to abandon treatment prematurely when the symptoms disappear, forgetting the chronic nature of amoebic infections. Treatment should be commenced early, carried on intensively, and repeated systematically.

An adult with acute infection should receive daily 0·08 to 0·10 gm. of emetine hydrochloride hypodermically, for a period of six to eight consecutive days. A second series of injections is given after a minimum interval of ten days, and thereafter the series are repeated, the interval being prolonged between each. The total length of treatment will depend on the history and clinical evolution of the case, the results of faecal examinations and the degree of intoxication. If intestinal disorders persist, or if cysts continue to appear in the faeces, recourse should be had to the double iodide of bismuth and emetine, or to some other medication indicated in chronic infections.

If there is some chance of disappointment when the treatment is not energetic enough, there is also danger in a too energetic use of emetine. The experiments of Guglielmetti and Houssay on the dog have shown that death may result (*a*) within 24 hours of the injection of very large doses (0·005–0·0075 gm. per kg. weight of dog); (*b*) within 7 to 12 days of injection; and (*c*) as a result of cumulative intoxication after a considerable interval. In man no sudden death from emetine poisoning has been reported, but several cases of delayed poisoning are on record. The writer considers that the following are the maximum doses that can be given with safety: 0·15 gm. daily for not more than four days; 0·10 gm. for not more than seven days; 0·05 gm. for not more than 12 days, with long intervals between the series.

J. Rosslyn Earp.

Manini (Leonida). **Contributo alla terapia medica dell'ascesso epatico dissenterico.** [The Medical Treatment of Dysenteric Abscess of the Liver.]—*Policlinico.* Sez. Prat. 1920. Mar. 15. Vol. 27. No. 11. pp. 323–327.

The article deals with a case of abscess of the liver in a patient with chronic dysentery. No amoebae were found either by puncture of the abscess or by examination of the faeces; but as the fluid taken out by test puncture did not show any leucocytes, but detritus and fragments of cells, the diagnosis was amoebic dysentery; moreover, the serological tests for bacillary dysentery gave negative results. The patient was treated only by emetine [see this *Bulletin*, Vol. 15, p. 192], *i.e.*, without surgical intervention, not even the evacuation of pus by puncture; 9–12 cgm. of the hydrochloride by hypodermic injection daily for four days; like series of injections followed at various increasing intervals, the second series after four days, the third after a week, the last after more than a week. The two latter series of injections were given as a precaution, because the patient had almost recovered after the second series. A month after the end of the treatment the condition was still quite good.

The author does not discuss the question whether recovery takes place by absorption of the contents of the abscess or by the formation of a fibrous capsule around its necrotic material.

E. J. Pampana.

[The evidence that an abscess, in the usual acceptation of the term, existed seems hardly sufficient.—P. H. M-B.]

Rénon (L.) & Blamoutier (P.). **Un nouveau cas d'abcès amibien du foie cliniquement guéri par l'émétine sans ponction ni intervention. (Présentation de malade.)**—*Bull. et Mém. Soc. Méd. Hôpit. de Paris.* 1921. Feb. 17. Vol. 37. No. 5. pp. 152–154.

The noteworthy points of this case were: The abscess was situated in the left lobe and was of sufficient size to cause an appreciable tumour underneath the xiphoid process. All symptoms disappeared with emetine injections and intravenous neosalvarsan. In 20 days the red cells had increased by 1,200,000, and the leucocytes had decreased from 19,200 to 8,200. The first symptoms of hepatic suppuration occurred 27 years after the first attack of dysentery.

P. H. M-B.

Mühlens (P.) & Menk (W.). **Ueber Behandlungsversuche der chronischen Amoebenruhr mit Yatren.** [Experimental Treatment of Chronic Amoebic Dysenteries with Yatren.]—*Muench. Med. Woch.* 1921. June 30. Vol. 68. No. 26. pp. 802–803.

The sum total of ten years' experience in the Tropical Institution in Hamburg indicates that at present we have no infallible cure for amoebiasis. Emetine injections have at the best but a fleeting and transitory effect; the authors have observed no appreciable alteration in amoebic ulceration of the bowel, both during and after the exhibition of this drug.

Since the war efforts have been made to discover a treatment for effecting the local extirpation of the entamoebae. Substances employed with the object of penetrating the deeper layers of the bowel, such as silver nitrate, iodine and chinosol solutions, all proved vain.

Appendicostomy and even caecostomy and subsequent lavage of the large bowel certainly ameliorated the condition, but did not accelerate the healing of the ulcerations. Since January 1921 experiments were undertaken with Yatren (5 parts iodine, 8 of oxychinolin, 7 of sulphate of soda). This preparation possesses high bactericidal properties without destroying the tissues, and at the same time acts as a cell stimulant. The first attempts were made with two specially resistant cases which after months of emetine treatment had undergone appendicostomy and caecostomy without success. In both instances an almost immediate clinical improvement took place. In six other resistant cases subsequently treated a similar remarkable improvement took place.

If on sigmoidoscopic examination ulceration is present, 200 cc. of a 2½-5 per cent. solution of Yatren should be introduced through a stout rectal tube in the usual manner. That absorption of the solution is taking place can be satisfactorily proved by means of the iron perchloride test of the urine. By the mouth Yatren can be given in powder form in capsules or pills in 1 gm. doses three times a day. Keratin coated pills are well borne. Intramuscular injection of 10 cc. of a 5 per cent. solution produced no undue reaction.

The following scheme of treatment is submitted; 8–14 days with enemata or doses by the mouth, with sigmoidoscopic and microscopic controls. After a week's interval repeat the treatment for 3–7 days; after still another similar interval a further course for 3–5 days. During active treatment absolute rest and strict dieting are necessary.

P. H. M-B.

VAN DER TOGT (A. C.) **Rietsuikerlavementen bij amoebendysenterie.** [Cane Sugar Enemas in Amoebic Dysentery.]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1921. Vol. 61. No. 4. pp. 395–402.

The occasional failure of emetine as well as of emetine bismuthous iodide and other drugs either applied by the mouth or by enema in the treatment of amoebic dysentery incited the author to search for another method of killing the amoebae within the colon. He tried to increase the osmotic tension in the bowel contents to a degree harmful to the amoebae. Sodium chloride, soda, etc., are *a priori* too irritating in high concentrations, but ordinary cane sugar in a 20–40 per cent. solution was found to be very useful. Enemas of this solution were given twice daily during eight consecutive days. In some cases the cure had to be repeated, but out of a great number of cases (number not stated) in one only the amoebae failed to disappear definitely. Excretion of blood and mucus subsides very soon and patients recover quickly under this treatment. A striking example is quoted of the results of this cure, which, according to the author is as cheap as it is harmless and effective.

W. J. Bais.

SMYRNIOTIS. **Les lavements intestinaux à base de Tannin en remplacement de l'émétine, dans la dysenterie amibienne aiguë.**—*Presse Méd. d'Egypte.* 1921. Feb. 1. N.S. No. 34. p. 435.

The injection per rectum of solution of tannin, according to the author of this paper, causes a rapid healing of amoebic ulcerations

and destruction of the amoebae. The formula recommended is as follows :—

Tannin	..	..	..	..	5 gm.
Tinct. opii	..	..	..	..	20 drops.
Arrowroot	..	..	..	..	15 gm.
Water	..	..	..	..	1 litre.

One enema should be given daily and the quantity graduated according to the condition of the patient. The fluid should be retained for a quarter of an hour.

P. H. M-B.

John (J C.). **Notes on a Case of Liver Abscess treated by Aspiration and Injection of Quinine Hydrochloride. Recovery.**—*Indian Med. Gaz.* 1921. Oct. Vol. 56. No. 10. pp. 379–380.

The patient, being unable to stand a general anaesthetic, was aspirated under local anaesthesia. Ninety ounces of pus were withdrawn and eight ounces of quinine hydrochloride solution (gr. v to ʒ j) were injected into the cavity. Subsequent treatment consisted of emetine injections, gr. j daily for one week. Sixteen days after the first a second aspiration became necessary and 64 ounces of pus were similarly withdrawn, followed by a second course of emetine. A month later the man left the hospital feeling very well.

P. H. M-B.

Fignolini (Felipe). **Sobre um caso de abscesso hepatico.**—*Brazil Medico.* 1921. June 11. Year 35. Vol. 1. No. 24. pp. 303–306.

A disquisition on the differential diagnosis of a case of liver abscess. Hepatic syphilis, hydatid cyst, carcinoma, bilharziasis and bacterial abscess are considered and dismissed in turn and a diagnosis of amoebic abscess arrived at in view of the rapid disappearance of the abscess under emetine injections and a history of previous dysenteric attacks.

F. S. Arnold.

Prentiss (Elliott C.). **Observations on Amoebic Colitis.**—*Southwestern Med.* 1921. July. Vol. 5. No. 7. pp. 10–16.

This paper contains no novel or original observations.

P. H. M-B.

Bacillary Dysentery.

Anderson (John). **A Study of Dysentery in the Field. With Special Reference to the Cytology of Bacillary Dysentery and its Bearing on Early and Accurate Diagnosis.**—*Lancet.* 1921. Nov. 12. pp. 998–1002. With 2 charts in text.

The writer was attached to a casualty clearing station on Suvla Bay from August, 1915, to the evacuation, and subsequently accompanied his unit to Egypt and served there and in Palestine and Syria until 1919.

In this paper he relates his experiences of dysentery, backed up by tables of statistics and graphs. In 1916 the weekly rate of dysentery per 100,000 strength was on the average about 80, but reached its maximum of over 200 in September of that year, after the battle of Romani. In the first quarter of 1917 dysentery was in abeyance ; during the second quarter a field laboratory was established in connection with the active troops, and the examination of 479 diarrhoeic

cases gave 8 as amoebic dysentery and 55 as bacillary dysentery (bacilli proven). Taking only the true dysenteries in this series the relative proportion would be :—Amoebic dysentery 12·7 per cent., bacillary dysentery 87·3 per cent. The autumnal rise of dysentery in 1917 commenced at the end of August and reached its maximum in mid-October. Of the total number of 501 abnormal stools examined in the laboratory, 385 proved to be bacillary and 5 amoebic; the percentage of the two forms works out, as bacillary dysentery 95·9 per cent., amoebic dysentery 4·1 per cent. Minute investigation upon the cytology of the freshly passed evacuations using stained films and making accurate differential counts of 500 cells revealed the following features :—

Bacillary Dysentery [proved by isolation of the Bacillus].

"1. The preponderance of polymorph leucocytes, which constitute on an average 90 per cent. of the total cellular exudate.

"2. Eosinophile cells were seldom or never present.

"3. Macrophages were present in limited numbers, averaging about 2 per cent., but their size renders them very conspicuous.

"4. 'Pyknotic' bodies were not found in any of the 15 cases under review." [*Cf.* Paper by Willmore & Shearman, this *Bulletin*, Vol. 12, p. 311.]

Amoebic Dysentery.

"1. The small proportion of polymorph leucocytes, the average content being only 7½ per cent.

"2. The presence of eosinophiles is a conspicuous feature, the number varying from 2 per cent. to nearly 5 per cent.

"3. Macrophages were not found in any of the five cases of this series.

"4. 'Pyknotic' cell remnants were present in all cases, their average number reaching the very high proportion of 83 per cent."

If a laboratory is situated at the base and, as not infrequently happens, cases do not reach the base hospital until the tenth or twelfth day of illness, the bacteriological records must differ widely from those of a laboratory behind the front line, where specimens can be examined possibly on the day when the man "reports sick." The proportion of positive bacteriological findings depends upon the freshness of the faecal specimens; it is rarely possible to recover dysentery bacilli from an 8-hour-old evacuation. This was illustrated in 1918 when the laboratory was situated some considerable distance from the scene of active operations; there, out of 900 specimens examined by culture during the year, only 75, or 8·3 per cent., gave definitely positive results. These figures should be compared with the findings of the laboratory during the autumn of 1917, when out of 194 specimens 116, or 60 per cent., were positive.

P. H. M-B.

Crichlow (Nathaniel). **Acute Bacillary Dysentery.**— *Jl. Trop. Med. & Hyg.* 1921. Aug. 1. Vol. 24. No. 15. pp. 204–206.

The type of dysentery prevalent in the British Solomon Islands is the bacillary; this has not yet been proved bacteriologically, but from the fact that liver abscess is unknown, and that emetine has no effect, it is assumed that amoebic dysentry is very uncommon.

The last dangerous and widespread epidemic was in 1915 when, amongst plantation labourers, 71 out of a total of 119 deaths had to be

ascribed to this disease. The mortality at the Government Hospital, Tulagi, for the past four years was as follows :—

	Number of cases treated.	Deaths.	Per cent.
1917	54 ..	10 ..	18·5
1918	52 ..	8 ..	15·4
1919	69 ..	8 ..	11·6
1920	88 ..	8 ..	9·1

Many of the cases are admitted to hospital in a hopeless condition.

P. H. M-B.

Boyd (Mark F.). **A Note on Bacillary Dysentery in Texas.**—*Texas State Jl. Med.* 1921. Sept. Vol. 17. No. 5. pp. 261–262.

This paper directs attention to the occurrence of bacillary dysentery in Texas. So far no case of infection with Shiga's bacillus has been recorded. The three cases here reported were all of the Flexner type. Stress is laid upon the necessity of culturing the blood and mucus free from faeces.

P. H. M-B.

Lorenz (Friedr. H.). **Eine Dysenterie-Y-Milchepidemie.**—*Ztschr. f. Hyg. u. Infektionskr.* 1920. Vol. 90. pp. 423–436.

An epidemic of food poisoning resembling in many ways in its dramatic onset paratyphoid or Gärtner infection broke out in an orphanage at Hamburg in August, 1919. Bacteriological investigation proved it to be a Flexner-Y epidemic, in which milk was regarded as the main medium in the spread of the disease.

The rarity of milk-borne dysentery epidemics is to be explained by the fact that these organisms are unable to multiply to any extent in bacteria-free milk, that is to say milk which has been rendered sterile by boiling. The pathogenicity of bacillary dysentery should be regarded not so much from the standpoint of the virulence of any particular strain of organism, as of the amount of the infecting dose of organisms and the mode of their conveyance.

P. H. M-B.

Davison (Wilburt). **Bacillary Dysentery in Children.**—*Bull. Johns Hopkins Hosp.* 1920. July. Vol. 31. No. 353. pp. 225–234.

This report is based upon 134 cases of diarrhoea in Baltimore. Clinically the disease was of a definite type, occurring in well-nourished healthy children whose ages ranged from 3 months to 11 years. In a series of 71 cases there were 15 deaths—a total mortality of 21 per cent. Complications were infrequent. In one case *B. coli* pyelitis supervened, otitis media in two, and hyperpnoea in three. Of the thirteen cases from which a satisfactory stool specimen was received, *B. dysenteriae* (Flexner) was recovered in six, *B. dysenteriae* (Shiga) in one, *B dysenteriae* (Kruse E. or *B. dispar*) in one. Agglutinins of *B. dysenteriae* (Shiga) were demonstrated in two additional patients. Of the 31 cases of clinical dysentery in the hospital wards *B. dysenteriae* (Flexner) was recovered in 18. Agglutinins of Flexner were demonstrated in seven additional cases, and in one further case similar bodies for Shiga.

In other words, infection with *B. dysenteriae* of one kind or other was shown in over 83 per cent. of cases of clinical dysentery in the hospital during the last year. The ratio of Flexner to Shiga infections

was 8 to 1. Using Dreyer's technique and standardized agglutinable emulsions it was found that a titre of 1 : 30 is suggestive, a titre of 1 : 50 diagnostic, of previous or present infection. Neither in a control series of 63 cases of simple diarrhoea nor in 100 normal children could *B. dysenteriae* be isolated from the stools, but the serums of three of the diarrhoea cases showed agglutinins. A curve showing the data of onset of the cases brings out the fact that the majority occurred during the height of the fly season in August.

The author urges that the term ileocolitis in children should be changed to dysentery and the disease made notifiable.

P. H. M-B.

Lade (O.) **Ueber Bacillenruhr bei Säuglingen und älteren Kindern, insbesondere ihre spezifische Behandlung sowie die prophylaktische Dysbakta-Impfung.** [Bacillary Dysentery in Infants and Older Children : Its Specific Treatment and Prophylactic Inoculation with Dysbakta.]—*Ztschr. f. Hyg. u. Infektionskr.* 1921. May 7. Vol. 92. No. 2. pp. 321–340. With 1 text fig.

This study was made on 143 cases of bacillary dysentery in children admitted to the author's clinic in Düsseldorf. All diagnoses were made upon clinical grounds, but, owing to "dysentery phobia," in the author's phrase, many other cases found their way to hospital on suspicion ; one, an intussusception in a breast-fed infant, is specially cited.

Thirty-three cases only were positively and bacteriologically diagnosed ; in 9 instances Shiga's bacillus was identified, twice a paratyphoid, and in the 23 remaining instances "pseudodysentery bacilli."

The paratyphoid cases were considered to be examples of a mixed infection. The seasonal incidence of the Shiga-Kruse infections was very marked in 1919, the highest point being reached in October of that year ; and in 1920 in July. House to house infection undoubtedly took place ; in October, 1919, three came from the same house, and seven from neighbouring habitations in the same street ; and in July, 1920, four occurred in neighbouring houses in two other streets. One typical case of dysentery was noted in a new-born child which died on the 19th day. The mother also suffered from dysentery. Many of the dysentery cases in children became chronic. The case mortality rate diminished with increasing age. For the first two years of life it was about 30 per cent., the immediate cause of death being broncho-pneumonia. In 19 autopsies, in addition to the characteristic lesions of the large gut, inflammation of the small intestine reaching as high as the jejunum was noted.

On the whole the effect of antiserum treatment (from 20 to 40 cc.) was considered favourable. Prophylactic injections of Boehnke's Dysbacta were given a trial, and as this vaccine had so far not been utilized in children the results are regarded as of some value. Forty children ranging in ages from 1-12 years were injected subcutaneously, with an interval of five days between each injection.

Infants received 0·1–0·3–0·5 cc., those in the second year 0·2–0·5–1 cc., up to the 12th year the dose was 0·3–0·5–1 cc.

A small reaction was noted after the injection. The results are difficult to appraise : of 13 children on whom control observations were made 5 contracted dysentery and, with the exception of 3 in whom the Dysbakta seemed to precipitate a slight attack of dysentery, all the remaining 37 remained quite well.

P. H. M-B.

Kuntze (Georg). **Ueber Ruhr im Kindesalter.** [Dysentery in Children.]—*Mediz. Klinik.* 1921. Mar. 13. Vol. 17. No. 11. pp. 307–311.

During the summer and autumn months of 1919, 143 instances of bacillary dysentery in children came under Kuntze's care, of which 85 were infants and 58 children over eighteen months of age; the majority of cases occurred during the months of August, September and October. In the case of 11 infants and 10 children the disease arose evidently as a house-infection. In 1920, 48 cases were noted—38 in infants, the remainder in children.

The clinical picture of this disease is by no means characteristic, especially in infants. Abdominal pain and tenesmus may be absent, the stools mucoid and by no means numerous. The differentiation from the milder forms of summer diarrhoea may not be an easy matter.

Shiga's bacillus was not uncommonly isolated. The infectiousness of bacillary dysentery in children is commented upon; many cases occurred in the same family.

The case mortality—41 per cent.—in infants is double the rate recorded in children above 1½ years.

Serum therapy in doses of 10 cc. for infants and double that amount for children proved unsatisfactory.

P. H. M-B.

Kostrzewski (J.). [In Polish and German.] **Krew chorych na czerwonke pod wzgledem bakterjologicznym.—Bakteriologische Blutuntersuchungen bei Dysenteriekranken.**—*Przegl. Epidemjol.* Warsaw. 1921. Vol. 1. No. 5. pp. 466–470. With 2 charts in text. German summary, p. 471.

Blood cultures with 120 cc. of venous blood to 100 cc. of bile were made on 115 dysenteric patients. In 33, that is 28·69 per cent., Shiga's bacillus was cultivated, in pyrexial as well as apyrexial cases. The dysentery bacillus is therefore not infrequently found in the blood stream, especially in the earlier stages of the illness. As a general rule cases of dysentery bacillaemia are severe cases from a clinical standpoint.

P. H. M-B.

Banu (Gl.). **Sur une forme particulière de dysenterie observée pendant la guerre.**—*Bull. de la Sect. Scient. de l'Acad. Roumaine.* 1920. p. 112. [Summarized in *Hygienische Rundschau.* Berlin. 1921. Oct. 1. Vol. 31. No. 19. p. 588.]

Banu observed 165 cases of bacillary dysentery; of these 133 became chronic and 76 per cent. died. Serum therapy in doses from 60 to 200 cc. injected at short intervals failed, but, according to the author, a specially prepared Flexner vaccine given to 22 cases was followed by more favourable results, and only 3 died; 1/400th to 1/50th of a killed gelatin slope and 1/200th of a living culture are injected. No essential details are given.

P. H. M-B.

Fitz-Gerald (W. E.). **An Outbreak of Bacillary Dysentery in a Boys' School.**—*Lancet.* 1921. Nov. 19. pp. 1051–1052.

This school in Southport has 40 boarders and an attendance of 150 day-boys. The first acute cases, in March, were typical bacillary dysentery. The organisms isolated were typically of Flexner type and

were agglutinated by type " Y " serum. The blood serum from seven mild cases agglutinated stock cultures of Flexner-Y up to 1 : 500. There were 10 cases altogether. Probably the source of infection was a carrier. Two boys had come from Bagdad in 1920 ; from the faeces of one a Flexner-Y organism was isolated. The infection commenced in a mild form and gradually increased in virulence.

P. H. M-B.

Job (Emile). **La conception actuelle de la dysenterie bacillaire.**— *Arch. Méd. et Pharm. Milit.* 1921. Apr. Vol. 74. No. 4. pp. 368–395.

The author, who has had experience of bacillary dysentery in Morocco, on the British front, and in Macedonia, has now published his more mature reflections upon this disease. Clinically, bacillary dysentery is more severe in Morocco than in France in peace time, while in Macedonia it was more severe than on the French front. The number of stools passed during a period of 24 hours may be taken as an index of the severity of the case, but it should not be the sole one ; the author has seen patients passing as many as 80 100 in a day get completely well. At autopsy in the acute forms he has observed hepatic changes, an increase in the volume of the organ being the most striking feature.

He distinguishes four forms, according to the general condition of the patient and the number of stools passed, as mild, average, severe, and toxic. A mild form of colitis frequently seen in Morocco and the East, a form characterized by diarrhoeic stools and bile-stained mucous flakes, is most certainly a mild bacillary dysentery. The diagnosis of bacillary dysentery is most readily made by the removal of some rectal mucus through the sigmoidoscope. Regarding complications, the dysenteric arthritis most frequently affects the knee, it may persist for five or six weeks and be accompanied by muscular atrophy, but finally clears up. Neuritis and even gastric symptoms may, he thinks, be considered as complications. The differential diagnosis from amoebic dysentery is not always easy to make. Contrary to generally accepted pre-war opinion bacillary dysentery often becomes chronic and is prone to relapse. This has been noted in Morocco as well as in German prisoners in France.

In a series of 275 chronic dysenterics neither " vegetative " entamoebae nor their cysts were discovered, and in 49 whose stools were systematically cultured Shiga's bacillus was recovered 21 times. In 147 of the remaining cases the serum reactions gave positive information ; 61 times agglutinins of Shiga's bacillus and 12 times of Flexner's bacillus were demonstrated. Mixed amoebic and bacillary infections occur not uncommonly. It was found that one quarter of a series of 169 chronic amoebic dysenterics showed evidence of bacillary infection, as their serum contained Shiga agglutinins. Stress is laid upon the necessity of procuring freshly passed stools for culture in order to determine positive results. He concludes that it is difficult to isolate the bacillus seven days after the commencement of the illness. Shiga infections are the most severe and account for the greater proportion of cases in the tropics, while the less virulent Flexner bacillus is more frequent in northern countries.

[This is a long discursive paper containing a large number of generalizations but little evidence of original work.]

P. H. M-B.

i. Dawson (W. S.) & Moodie (W.). **The Aetiology of Bacillary Dysentery in Asylums.**—*Lancet.* 1921. July 30. pp. 225–226. With 2 charts in text.

ii. Stewart (R. M.). **Aetiology of Asylum Dysentery.** [Correspondence.]—*Lancet.* 1921. Aug. 20. p. 416.

i. In spite of all efforts to control it, dysentery has in the past been the cause of a large amount of the sickness in asylums.

During the year 1919 in 80 county and borough asylums 1,722 cases were notified, and of these 20 per cent. died—forming 3 per cent. of the total number of deaths. Contrary to the accepted view that it is a disease of hot weather and is generally spread by flies, the highest incidence of cases in Claybury occurs during the winter months.

It would appear that asylum dysentery spreads, not so much through flies, as by some more direct method from patient to patient, as by "carriers" of the bacillus.

Relapsing cases are probably carriers; for instance, of 590 patients who have suffered from dysentery in Claybury during the last 12 years, 18 per cent. relapsed once, 6 per cent. twice, and 3 per cent. three times. In mild cases the dysentery bacillus disappears from the faeces in a few days, but reappears directly a relapse occurs.

To ensure the complete eradication of the disease from asylums it would be necessary to carry out a complete scheme of permanent isolation, as is at present being done at Claybury.

A bacillus of the Flexner type was cultivated from the faeces by the usual methods. At one autopsy, although ulceration of the intestine existed as high up as the duodenum, only cultivation from the rectal contents yielded the bacillus.

By employing the Oxford antigen of Dreyer, it was ascertained that the first trace of agglutinins appeared at the end of the sixth week, but had disappeared entirely at the end of the fourteenth. With Dudgeon's antigen positive agglutination results were obtained at the beginning of the fourth week.

ii. In reply to the paper by Dawson and Moodie, Stewart maintains that recent experimental researches on the influence of accessory food factors upon nutrition has lent a new aspect to the subject of asylum dietaries. May not dysentery, or the liability to the disease, be due partly to an inadequate supply of vitamins?

The chronic demented lunatic is specially liable to dysentery, and it is a familiar fact that the attendants and nursing staff of asylums are seldom attacked. A supply of a well-balanced diet for the insane becomes increasingly difficult to obtain during the winter months, and possibly it is due to this fact that the incidence of dysentery is highest during that period.

P. H. M-B.

Janowski (W.). **Quelques remarques sur l'étiologie de la dysenterie.**—*Paris Méd.* 1921. Aug. 20. 11th Year. No. 34. pp. 152–154.

Janowski considers the aetiology of dysentery to be in an unsatisfactory state. Clinicians, he says, all the world over have been struck by the facts that two or three pathogenic bacteria may be present in the stools at the same time; that although a large number of organisms may be considered pathogenic, nevertheless their presence can be verified only in a quarter or a third of the clinical cases of the disease; and that further confusion has resulted from the varied

interpretations of the serum reactions. Considerable diversity of opinion exists as to the efficacy of antidysenteric serum. The remaining objections, related *in extenso*, are not easy to follow.

P. H. M-B.

Hermel. **Beiträge zur Klinik, Bakteriologie und Therapie von Bazillenträgern der Typhus- und Ruhrgruppe.** [The Management, Bacteriology and Treatment of Bacillus Carriers of Typhoid and Dysentery.]—*Beiträge zur Klinik der Infektionskr. u. Immunitätsf.* 1919. Vol. 8. p. 176. [Summarized in *Arch. f. Schiffs- u. Trop.-Hyg.* 1921. Vol. 25. No. 8. p. 251.]

A summary of work performed at Spa during the German occupation. Here lay the concentration camp for all convalescents from typhoid and paratyphoid and dysentery. The investigations were carried out over a period of four years and concerned 34,100 patients convalescent from enteric, and 5,000 from dysentery. The percentage of chronic carriers of *typhosus* was found to be 0·25 per cent., that of *paratyphosus* B, 3·9 per cent., and of *paratyphosus* A, 2·2 per cent.

Direct plating of the faeces gave the best results. Organisms of the enteric group were found to be present in the mouth-cavity of carriers and even healthy individuals; they were also found in inflammatory lesions.

Attempts to treat and sterilize carrier cases did not meet with success. Before one should pronounce a chronic carrier as free from infection it is advisable to cultivate the bile obtained by means of a duodenal sound.

P. H. M-B.

Megaw (J. W. D.). **Chronic Dysenteric Peritonitis.**—*Indian Med. Gaz.* 1921. Sept. Vol. 56. No. 9. pp. 321–323.

Under this title the subject of ascites, so common in Indian hospital practice, is discussed. So far no satisfactory explanation of the frequency of these cases has been forthcoming; they have been attributed to alcohol, malaria, or syphilis, on grounds which are entirely inadequate.

Notes of 61 cases were obtained in a period of two years; more than half the patients were between 25 and 40 years of age. Children are rarely affected, while old people are quite commonly attacked. Most cases gave a history of dysentery or diarrhoea previous to the onset of ascites. The ascites is probably due to a general fibrous peritonitis, brought about by the passage of dysenteric toxins through the gut wall.

Dysenteric peritonitis is prone to supervene in dysentery cases treated by opiates or in those in which treatment has been altogether neglected. On the other hand, peritonitis is unlikely to supervene in cases treated on an adequate and rational basis, but when once established prospects of cure cannot be entertained.

The results of agglutination tests (microscopic method) were rather variable. Out of 40 cases, 23 agglutinated Flexner's bacillus, 4 Shiga's bacillus, and 6 *Bacillus coli*. Twenty-seven were examined as controls, 7 of which agglutinated Flexner, 1 Shiga and 1 *Bacillus coli*. The duration of this disease is generally under a year; probably the average is less than six months from the first appearance of ascites. Vaccine treatment with Flexner's bacillus was unsuccessful; omentopexy gave encouraging results in one case only. At autopsy a general

fibrotic thickening of the peritoneum in the upper part of the abdomen is observed; in one only out of five was there any degree of hepatic cirrhosis. Numerous adhesions between the viscera are usually present, and the large intestine may show signs of recent scarring and ulceration. A plea is issued for more systematic research on this subject.

P. H. M-B.

LICHTENSTEIN (A.). **Een geval van chronische bacillaire dysenterie, type Shiga-Kruse.** [A Case of Chronic Bacillary Dysentery, Shiga-Kruse Type.]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1921. Vol. 61. No. 1. pp. 41–45.

A sailor had in four months' time four attacks of dysentery, during the last of which B. Shiga-Kruse was cultured from the stools. There is no certainty whether the same was present in the former attacks (the first two of which were cured by emetine), and it is not reported whether the bacillus was present in the stools some period after the patient had recovered from the last acute attack. The case could scarcely be considered as one of real chronic bacillary dysentery.

Chronic Shiga-Kruse dysentery is very rare in the Dutch East Indies. SNIJDERS found one case during the epidemic at Tanah Poetih (see this *Bulletin*, Vol. 16, p. 9).

W. J. Bais.

BURKITT (R. W.). **The Use of Rhubarb in Acute Bacillary Dysentery.** [Correspondence.]—*Lancet.* 1921. July 30. pp. 254–255.

In Nairobi it has been the custom during the last three years to treat acute bacillary dysentery with powdered Turkey rhubarb root (*pulv. rhei rad.*).

The dose is half a teaspoonful every one, two, or three hours until the drug appears in the stools. To children small and frequent doses should be given (gr. 5 every two hours for three consecutive doses). "No one who has ever used rhubarb would dream of using anything else."

P. H. M-B.

CHIARI (O. M.). **Zur chirurgischen Therapie der Ruhr.** [The Surgical Treatment of Dysentery.]—*Mediz. Klinik.* 1921. Feb. 27. Vol. 17. No. 9. pp. 243–245.

This paper takes the form of a clinical lecture setting forth the advantages to be derived from appendicostomy in long-standing bacillary cases with incessant diarrhoea.

The consideration that in quite 2 per cent. of bacillary dysentery cases the disease became chronic, added to the fact that bacillary dysentery raged in Germany during the latter years of the war to a hitherto quite unprecedented extent, has contributed to the importance of this subject at the present time. The appendicostomy should be performed under local anaesthesia, and the bowel subsequently washed out with 0·5 per cent. copper sulphate or 2 per cent. tannic acid solution.

The author develops arguments for his belief that appendicostomy should be more freely undertaken in the earlier stages of the disease, and not, as is the practice at present, when the outlook has become hopeless. Opinion seems to be divided whether caecostomy, or left

inguinal colotomy, offers more advantages than the more simple operation of appendicostomy; the author believes that the latter operation is preferable in chronic cases, while in more acute cases caecostomy is the more efficient.

P. H. M-B.

Danysz (J.). **Traitement des dysenteries microbiennes par des entéro-antigènes non spécifiques: quelques réflexions sur les réactions provoquées par les microbes de la flore intestinale normale.**—*Presse Méd.* 1921. May 7. Vol. 29. No. 37. pp. 362–363.

During the summer of 1920 a considerable epidemic of dysentery reigned in Poland. The country was ripe for development of all kinds of diseases after six years of war and the passage of large numbers of troops of all nations through the land.

Owing to the conditions existing it was not possible to determine the exact type of dysentery prevailing, and the author limits himself to philosophical deductions as the result of the apparently successful treatment of large numbers of cases by means of an entero-antigen compound of *B. coli*, enterococci, diplococci, and *B. proteus*, organisms in no way concerned in the etiology of the disease. The emulsion of these organisms, heated to 80°–100° C., was ingested by the mouth or injected per rectum in a dosage of several hundred milligrammes.

The exact manner in which these non-specific antigens exert a beneficial action is not understood; it may be that by direct action upon the liver they increase the biliary secretion. At any rate the author has convinced himself that the entero-antigens act directly by stimulating all internal secretions.

P. H. M-B.

Creighton (Catherine), Wagner (C. E.) & Davison (Wilburt C.). **The Isolation of *B. dysenteriae* (Flexner) from the Urine of an Infant with Dysentery.**—*Bull. Johns Hopkins Hosp.* 1921. Feb. Vol. 32. No. 360. pp. 50–51.

Dysentery bacilli have rarely been found in the urine of dysentery patients.

The case reported shows that a typical *B. dysenteriae* (Flexner) was found as a result of routine cultures in the catheterized urine of a child with bacillary dysentery, uncomplicated by vaginitis, pyelitis, cystitis, or other urinary complication.

The patient's serum agglutinated the bacillus in question up to a dilution of 1 : 100.

P. H. M-B.

Siki (Hermann). **Bakteriologische Untersuchungen am pathol.-anatomischen Material von Bazillenruhr.** [Bacteriological Examinations made on Post-mortem Material in Bacillary Dysentery.] —*Ztschr. f. Hyg. u. Infektionskr.* 1920. Vol. 90. pp. 337–386.

Dysentery bacilli can generally be cultivated with ease at autopsy from the necrotic mucosa, so that probably many intestinal diseases whose etiology has hitherto remained unrecognized, and which differ considerably in their gross pathological appearances, are in reality various forms of bacillary dysentery.

Bacillary dysentery may be so slight as to excite merely a catarrhal inflammation of the mucosa of the large intestine.

Chronic dysentery is generally of a relapsing character, and from the lesions at autopsy, by the employment of suitable technique, dysentery bacilli can be cultured; on this account chronic sufferers from this disease should be regarded as infectious to others. The mucous retention—cysts and submucous abscesses in chronic dysentery—should be regarded as reservoirs for the dysentery bacilli during latent periods of the disease. Diarrhoeic and dysenteric attacks during the course of tuberculosis, malaria, and septic diseases are often caused by recrudescence of a hitherto unrecognized bacillary dysentery infection.

P. H. M-B.

Jacoby (Fritz). **Die Bedeutung der Azidität der Ruhrstühle für die bakteriologische Ruhrdiagnose.** [The Importance of Acidity of Dysenteric Stools for Bacteriological Diagnosis.]—*Ztschr. f. Hyg. u. Infektionskr.* 1920. Vol. 90. pp. 1–21. With 4 figs.

The acid reaction of the dysentery stool occurs quite independently of the presence of dysentery bacilli in that particular specimen. The reaction depends upon other factors, such as the *consistency* of the stool, the nature of the humoral exudate from the body, and the nature and number of other micro-organisms. To a less degree the chemical composition of the food and the products of digestion exert their influence. The higher the temperature the more acid does the stool become.

It is a bacteriological commonplace that dysentery bacilli can only be isolated from an acid stool with difficulty, and the more marked this reaction, the more difficult the process becomes. It is this acidity which is so deleterious to the organism; therefore, dysentery bacilli can be cultured without difficulty only from stools which have recently been passed.

P. H. M-B.

Fukuhara (Yoshimoto). **A New Method of Testing Antitoxic Dysentery Serum.**—*Jl. of Immunology.* 1919. Sept. Vol. 4. No. 5. pp. 299–307.

The antitoxic value of an anti-dysenteric serum can best be estimated by preserving it in a dry state in vacuum tubes. The standard anti-toxin unit adopted is the amount required to neutralize 100 minimum lethal doses of toxin; the latter may be estimated as the amount which when mixed with a unit of anti-toxin and injected intravenously into a rabbit of 1,500–2,000 gm. in weight, caused the death of the animal within four or five days. Deterioration of dysentery toxin can be attributed to a change of the toxin molecule into a non-toxic modification which possesses no avidity for the antitoxin. The toxin molecules lose their toxicity without the formation of toxoids, differing from the diphtheria toxin in this important respect.

P. H. M-B.

Graham (Stanley G.). **The Bacteriology of Infectious Diarrhoea.**—*Canadian Med. Assoc. Jl.* 1921. Aug. Vol. 11. No. 8. pp. 529–531.

In a series of 29 cases of infectious diarrhoea at the Hospital for Sick Children, Toronto, studied during the summer of 1920, 62 per cent. were proved by cultural methods to be due to a dysentery bacillus of the Hiss-Russell type. In stools obtained early in the disease pus

cells were always present. Stools were examined daily until it was proved that a dysentery organism had been isolated. In direct smears of early cases the predominating organism was a Gram-negative bacillus. This fact alone was of value in making a tentative diagnosis of dysentery.

P. H. M-B

SCHMITT (Hans). **Das Verhalten der Ruhrbazillen und der Typhus-Coli-Bazillen in eiweissfreien Lackmusnährböden.**—The Behaviour of Dysentery, Typhoid and Coli Bacilli in Albumen-Free Litmus Media.—*Cent. f. Bakt.* 1. Abt. Orig. 1921. Apr. 1. Vol. 86. No. 2. pp. 119–123.

It has been stated that in sugar solutions in which albumen-free litmus is used as indicator the typical reactions of the typhoid-coli group do not take place. This does not hold good, at any rate, as regards the bacilli of the dysentery group. In some strains, however, the change in colour does not take place for some considerable time.

The experiments of VON WERDT and KOPATSCHEK—to which the author's attention was directed, but with whose conclusions he does not entirely agree—are based upon correct principles, namely that the exact composition of the nutrient medium as well as that of the indicator should be standardized.

P. H. M-B.

WOLF (G.). **Ueber das wechselnde kulturelle Verhalten von Ruhrstämmen auf den zur Differentialdiagnose angegebenen Zuckernährböden.**—The Varying Behaviour of Dysenteric Strains in Cultures on Sugar Media devised for Differential Diagnosis.—*Cent. f. Bakt.* 1. Abt. Orig. 1921. July 8. Vol. 86. No. 6. pp. 476–480.

None of the strains of Shiga-Kruse bacilli investigated produced acid in mannite; on the other hand, no strain of Flexner-Y has failed, when tested over a sufficiently long period, to produce acid in this sugar.

In the differentiation of the dysentery organisms it is not sufficient to rely upon the sugar reactions. It is no longer practical or scientific to differentiate between Y and Flexner strains; nor is it possible to obtain a sharp differentiation between them by means of immune serums; they should therefore be designated as the Flexner-Y group, in contradistinction to the Shiga-Kruse group.

P. H. M-B.

TWORT (F. W.). **Researches on Dysentery.**—*Brit. Jl. Experim. Path.* 1920. Oct. Vol. 1. No. 5. pp. 237–243. With 1 plate.

Three types of organisms characterized by special forms can be isolated from dysentery and allied bacilli. The forms termed type A are thick, long bacilli which may become twisted like a spirochaete; type B are long, thick rods, swollen in the middle or at one end; bacilli of type C are similar to B, but are shorter. In older cultures most of the units are globular and the protoplasm may collect in a semilunar mass. A filter-passing material capable of watering down individual bacilli into granules may be present in cultures of dysentery bacilli, a process which resembles the phenomenon described by D'HERELLE see this

Bulletin, 1918, Vol. 11, p. 262]. The special types A, B and C are produced by normal bacilli when grown upon a special medium (beef extract, 2 per cent. agar with 0·1 per cent. sodium bicarbonate, 0·5 per cent. litmus solution and 0·5 per cent. maltose). These forms are probably not stages in a true life-cycle, but are possibly concerned with the incubation period of the disease, successful infection, and the production of immunity.

P. H. M-B.

ZOELLER (Chr.). **Bacille de Shiga auto-agglutinable.**—*C. R. Soc. Biol.* 1921. Jan. 15. Vol. 84. No. 2. pp. 87–88.

An artificial culture of Shiga's bacillus is here under discussion. It was first noticed that when grown in broth flocculi form at the bottom of the tube ; the bacillus is in fact auto-agglutinable. In other respects it is a typical Shiga bacillus ; it ferments glucose, and is lethal to rabbits on intravenous injection, and when recovered from the peritoneal exudate of the experimental rabbit preserves these characteristics, which, indeed, persist even after frequent subculture.

P. H. M-B.

ZOELLER (Chr.). **Bacille de Shiga auto-agglutinable (caractères sérologiques).**—*C. R. Soc. Biol.* 1921. Nov. 5. Vol. 85. No. 31. pp. 800–801.

A short account of a culture of Shiga's bacillus isolated during routine bacteriological work, which was found to clump automatically in normal saline as well as in physiological saline. A twenty-four hours' culture is emulsified in 5 per 1000 saline. The flocculi formed are fine and granular and can be easily broken up by gentle agitation of the tube. Complement-deviation tests, using this atypical bacillus and a typical Shiga organism as antigens, indicated that in both strains the behaviour was identical. A cross immunity can be produced in rabbits by injection of cultures of these organisms. Attempts to transform the bacillus into the typical form did not meet with success.

P. H. M-B.

WOLLSTEIN (Martha). **Studies on the Phenomenon of d'Hérelle with *Bacillus dysenteriae*.**—*Jl. Experim. Med.* 1921. Nov. 1. Vol. 34. No. 5. pp. 467–476. With 5 plates.

A lytic fluid for dysentery bacilli can be obtained from the peritoneum of the guinea-pig by intraperitoneal injection of live dysentery bacilli ; it is not exactly specific for dysentery organisms, as it exerts a group action upon the dysentery-colon-typhoid group.

The action of this fluid on dysentery bacilli, both *in vivo* and *in vitro*, is to divide the culture into sensitive and resistant strains ; the latter can be carried to a degree of very marked and almost complete resistance to lysis. The sensitive strains are both lysogenic and agglutinable. These bacilli gradually lose this lysogenic property, but very resistant ones never acquire it ; and it is possible that the resistant bacilli are responsible for the fatal disease in human beings.

There is evidence that d'Hérelle's phenomenon goes on in the human intestine in patients suffering with dysentery. That phenomenon is

the expression of a lytic reaction occurring between an infecting bacterium and a substance elaborated in the organism infected, probably by the leucocytes and other tissue cells, in response to the invasion.

Lysis of cultures of B. Shiga is convincingly demonstrated in the plates illustrating this work.

P. H. M-B.

BAIL (Oskar). **Ueber Shiga-Bakteriophagen.**—*Wien. Klin. Woch.* 1921. Nov. 17. Vol. 34. No. 46. pp. 555–556.

Of all the bacteria so far studied, Shiga's bacillus is most easily destroyed by bacteriophagic substances, originally discovered by d'HÉRELLE in extracts of dysentery stools. The author's investigations were made with two filtrates, to which distinctive names were given—one of which was active against cultures of Shiga's bacillus in dilutions as high as 1 : 1,000 million. A bacteriophagic filtrate does not increase in power if incubated in bouillon, but if living Shiga bacilli are added after a latent period the bacteriophagic power of the fluid becomes greatly augmented.

There are several bacteriophagic substances, and the author claims that from one of his extracts he has succeeded in separating two. These can be distinguished from one another by their action upon cultures of Shiga's bacillus. Broth which has been inoculated with Shiga's bacillus and has become cloudy clears in a couple of hours when inoculated with a bacteriophagic extract. Not all individual bacilli of the same culture are affected by the bacteriophage in the same manner, and by selecting such organisms it is possible to cultivate a strain which is resistant to bacteriophagic action. An interesting development of this line of work has recently taken place; it has been found that bacteriophagic substances may appear in cultures of normal organisms in pure culture. For this purpose the organisms must be cultured in bouillon and frequently precipitated by centrifugation; finally a stage is reached when no more growth will take place in the clear fluid. It is then heated to 58° C. Injection of bacteriophagic fluids into rabbits will produce an antibacteriophagic serum.

P. H. M-B.

HAUSHERR (Otto). **Beitrag zur Frage der physiologischen Agglutination von Y-Ruhrbazillen.**—[Physiological Agglutination of the Y-Dysentery Bacilli.]—*Cent. f. Bakt.* 1. Abt. Orig. 1921. Oct. 15. Vol. 87. No. 2. pp. 95–109.

The author has confirmed the observations of LOEWENTHAL [this *Bulletin*, Vol. 17, p. 177] upon the agglutination in high titre of Y-dysentery bacilli by the serum of pregnant women. The titre varies greatly in the case of different strains of the bacillus; in the serums investigated by the author 37 per cent. agglutinated a culture of the bacillus in a dilution of 1 : 100 during a period of two hours.

A doubtful agglutination sometimes takes place when similar physiological serums are tested against the Shiga-Kruse bacillus and the cholera vibrio; on the other hand, typhoid bacilli are unaffected.

The peculiarity of "pregnant" sera in this respect is not easily explained; at any rate it is in no way correlated with the typhoid content of the serum. This agglutination is *not* specific, and occurs quite independently of any connexion with the disease dysentery. It depends, probably, upon some subtle physiological property of the bacillus, and is to be regarded in the same light as the physiological agglutination of red blood corpuscles by strange sera.

P. H. M-B.

Loewenthal (Waldemar). **Berichtigung zu meinen "Erklärungsversuchen für die Ruhragglutination durch Schwangerenserum."**—[Correction to the Author's Paper, "Attempts to explain the Agglutination of Dysentery Bacilli by the Serum in Pregnancy."] —*Ztschr. f. Immunitätsf. u. Experim. Therap.* 1. Teil Orig. 1921. Vol. 31. No. 4/5. pp. 454–455.

Apparently, in comparing the phenomena he observed in the agglutination of dysentery bacilli by the serum of pregnant women with the acid agglutination of Michaelis, the author has made a fundamental error in the interpretation of the hydrogen-ion concentration theory, and this he now explains [see this *Bulletin*, Vol. 17, p. 177].

P. H. M-B.

Stawell (R. R.). **The Treatment of Bacillary Dysentery.**—*Med. Jl. Australia.* 1921. June 18. 8th Year. Vol. 1. No. 25. pp. 496–497.

The unsuitability of milk in the acute stages of bacillary dysentery, both in adults and infants, is the main theme of this paper.

P. H. M-B.

Mixed and Unclassed Dysentery.

Dew (H. R.) & Fairley (N. Hamilton). **The Dysenteric Infections.**—*Med. Jl. Australia.* 1921. June 4. Vol. 1. 8th Year. No. 23. pp. 453–460. With 7 text figs.

This paper, based mainly upon military experience, summarizes modern knowledge upon the etiology, pathology and treatment of the dysenteries. A table is given summarizing the laboratory examination of 1,816 consecutive specimens of faeces from patients in the 14th Australian General Hospital in Cairo.

		Positive.	Negative.	Total.
Bacillary	B. Shiga	41	229	326
	B. Flexner	56		
Protozoal	Amoebae:		1,025	1,371
	E. histolytica	97		
	Cysts of *E. histolytica*	82		
	Flagellates:			
	Lamblia intestinalis	39		
	Tetramitus mesnili	64		
	Trichomonas intestinalis	63		
	Ciliates:			
	Balantidium coli	1		
Helminthic	*Bilharzia mansoni*	33	87	120

At first sight it would appear that the percentage of positive findings in this series is not high; the observations were conducted at a base hospital situated at the end of a long line of communications. In consequence many patients were convalescent on arrival, with normal stools. Successful isolation of dysentery bacilli could, under the circumstances, hardly be expected. The other anomaly demanding explanation is the apparent preponderance of amoebic over bacillary infections. These findings are not to be taken as representing the true incidence of these two diseases in the War zone, where bacillary dysentery was the more frequent disease.

The appearance of the bacillary dysentery stool under the microscope is characteristic. These observers note certain stigmata of toxic spoiling such as karyolysis, pyknosis of nuclear material and fatty cytoplasmic degeneration in the polymorphonuclear pus cells. Macrophage cells were extremely common, especially in the later and healing stages of the disease; in 34 consecutive cases examined they were present in 18.

Studies upon the pathology of bacillary dysentery were based upon a series of 250 autopsies, mostly Egyptian cases. The outstanding features of rapidly fatal cases were an acute inflammation of the superficial layers of the colon and sometimes of the lower third of the ileum and the stigmata of toxic spoiling of the viscera. In one instance B. Flexner was isolated from a splenic abscess; the patient was infected with relapsing fever as well. Myocarditis and serous pericarditis were commonly observed. In amoebic dysentery, owing to the nature of the ulcers and the tendency to thrombosis, local complications are common. In this series of cases there were seven deaths from perforation secondary to gangrenous colitis. Surgical interference would appear to be hopeless. In the treatment of hepatic abscess the authors suggest that it is futile to explore the liver with a needle of the ordinary calibre; difficulty may be experienced in aspirating the pus, despite the fact that the needle is in the abscess.

P. H. M-B.

Patterson (S. W.) & Williams (F. E.). **Epidemic Diarrhoea. A Preliminary Account of Observations made in Melbourne during the Summer Months, 1920–1921.**—*Med. Jl. Australia.* 1921. June 4. Vol. 1. 8th Year. No. 23. pp. 460–464. With 6 text figs.

The material in the present study was derived from 90 cases of epidemic diarrhoea occurring from March to November in Melbourne General Hospital. The clinical features of these cases were of the most diverse kind. The actual numbers and types of pathogenic organisms recovered were :—

	Cases.
Entamoeba histolytica	4
B. dysenteriae, Flexner	18
B. dysenteriae, Shiga	1
B. suipestifer	5
B. morgan No. 1	4
Streptococcus haemolyticus	1
B. tuberculosis	1

From six patients showing clinical signs of dysentery a type of organism was isolated resembling that described in Denmark by Sonne and in Norway by Thjotta.

P. H. M-B.

Hurst (Arthur F.). **The Diagnosis of Dysentery by the Sigmoidoscope.** [Correspondence.]—*Lancet.* 1921. June 4. p. 1211.

This correspondence has been evoked by the paper of Manson-Bahr and Gregg [see this *Bulletin*, Vol. 18, p. 35]. Hurst has had the privilege of examining cases in which actual ulceration of the bacillary type was present. The appearances are identical with those observed in ulcerative colitis; the ulcers are shallow, irregular in outline, of varying size, and separated by a swollen and congested mucous membrane; in contrast to these, amoebic ulcers are more regular in shape. It is possible to watch from day to day the healing of amoebic ulcers with emetine treatment and those of bacillary origin with antidysenteric serum.

P. H. M-B.

Lockhart-Mummery (J. P.). **The Diagnosis of Dysentery by the Sigmoidoscope.** [Correspondence.]—*Lancet.* 1921. June 25. p. 1381.

This correspondent emphasizes the value of a sigmoidoscopic examination, not only as an aid to diagnosis, but as a valuable means of appraising treatment. It is easy to distinguish between the ulceration of amoebic and bacillary dysentery, although their symptomatology may be similar. Other types of ulceration of the colon may be distinguished. When cases of chronic dysentery of either type are systematically examined with the sigmoidoscope, it is found that they are frequently followed by an ulcerative colitis, which is much more chronic than is the original disease. These severe secondary ulcerations of the colon clear up very satisfactorily after an appendicostomy, which must not be done as a last resort.

P. H. M-B.

Graham (George). **Arthritis in Dysentery: Its Causation, Prognosis and Treatment.**—*Proc. Roy. Soc. Med.* (Sect. of Med.). 1919. Dec. Vol. 13. No. 2 pp. 23–42. With 5 charts in text.

The first symptom of arthritis was severe pain preceding by some hours the swelling of the joint. The effusion took place quickly and was usually large in amount without reddening of the skin. In some instances many joints were attacked on the same day; generally, however, they were involved at intervals. The joint most often affected was the knee—both knees in 16 and one in 15 cases; ankles and elbows came next in frequency; the smaller joints of wrists and hands were symmetrically affected in three cases; in five, one hand only was attacked; in one, the sternoclavicular joint.

Generally speaking, the onset took place before the twelfth day of illness, in some between the twelfth and twenty-ninth, and in one exceptional case on the ninetieth, 13 days after a relapse of dysenteric symptoms. Arthritis was usually accompanied by long-continued pyrexia. The progress of the cases varied very greatly; when the joint effusions subsided quickly there was seldom any after-trouble; in other cases stiffness remained, but it is believed that ultimately all joints recover completely.

Eye symptoms of two kinds were noted in association with arthritis: (*a*) a subacute conjunctivitis unaccompanied by any purulent discharge, and occasionally with photophobia, and (*b*) a cyclitis or an iridocyclitis appearing between the fourteenth and thirty-fourth day of the

disease (in one case on the eighty-eighth), sometimes a few days before or after the involvement of the joints. The conjunctivitis cleared up quickly with 2 per cent. argyrol washes, while the irido-cyclitis yielded to atropine. In one case, however, ring synechiae resulted, and an iridectomy had eventually to be performed.

The question whether the administration of serum prevents the involvement of the joints is difficult to answer. The treatment of dysenteric arthritis is unsatisfactory. Sodium salicylate, even in doses of 20 gr. every two to four hours, has little apparent effect upon the joint effusions or the pyrexia. The injection of anti-dysenteric serum has apparently no effect.

P. H. M-B.

Cantlie (James). **Post-Dysenteric Colitis; the Seat of the Lesion and its Treatment.**—*Practitioner.* 1920. Mar. Vol. 104. (No. 621.) No. 3. pp. 161–166.

This paper contains no new information, but recapitulates the author's well-known views on such subjects as the existence of a recto-sigmoid pylorus, the uses and manipulation of the sigmoidoscope, and the cauterization of the lower bowel with pure carbolic, followed by saline enemata, in the treatment of the condition inaccurately known as post-dysenteric colitis.

P. H. M-B.

Bonnet (P.) & Michon (L.). **Appendicular Symptoms in Dysentery.**—*Lyon Chirurgical.* Lyons. 1921. Jan.–Feb. Vol. 18. No. 1. p. 14. [Summarized in *Jl. Amer. Med. Assoc.* 1921. May 14. Vol. 76. No. 20. p. 1372.]

Symptoms suggesting appendicitis are often the precursors of an exacerbation of a latent dysentery. The authors report a fatal case of gangrenous perforation of the caecum of amoebic origin, suggesting, of course, the diagnosis of appendicitis during life. This case is one more exhortation that in the tropics the stools should always be microscopically examined for entamoebae in any suspected case of appendicitis.

P. H. M-B.

Maxcy (Kenneth F.). *Giardia* (*Lamblia*) *intestinalis.* **A Common Protozoan Parasite of Children.**—*Bull. Johns Hopkins Hosp.* 1921. May. Vol. 32. No. 363. pp. 166–170.

The material examined came from one of the clinics of the Johns Hopkins Hospital. The results are confirmatory of observations elsewhere, *Giardia intestinalis* being found to be present in the intestine of a large percentage of apparently normal children.

A. A.

Boyd (William). **The Detection of** *Lamblia* (*Giardia*) *intestinalis* **by Means of the Duodenal Tube.**—*Canadian Med. Assoc. Jl.* 1921. Sept. Vol. 11. No. 9. pp. 658–660.

The object of this paper is to suggest a simpler and more reliable method of finding Lamblia than by mere faeces examination.

A duodenal tube was passed upon a convalescent typhoid case, with the object of testing whether he was or was not a carrier of the disease. By means of Lyon's magnesium sulphate method the contents of

the gall-bladder and duodenum were obtained. The observer was astounded at the number of active *Lamblia intestinalis* he found in the fluid. The bile itself was clear and perfectly normal and on culture yielded a pure growth of the typhoid bacillus.

A month later he was re-examined by the same method, but, though the bile was swarming with typhoid bacilli, no Lamblia were present.

It is probable that Lamblia infections can be more readily diagnosed by means of the duodenal tube than by faeces examination.

P. H. M-B.

Cade (A.) & Hollande (A.-Ch.). **L'entérite à** *Giardia* (*Lamblia*) *intestinalis.*—*Arch. mal. app. dig. et nutrition.* Vol. 10. pp. 193–222. [Summarized in *Bull. Inst. Pasteur.* 1921. May 15. Vol. 19. No. 9. pp. 323–324.]

The conclusions are based upon a study of 10 cases. The pathogenicity of the parasite (*Lamblia intestinalis*) can hardly be a matter of doubt any longer. Diarrhoea is the most usual symptom, but Goiffon and Roux have reported appendicitis caused by this parasite, while Fairise, Jannin and Jacquot actually cite a fatality due to intestinal lambliasis.

P. H. M-B.

Prentiss (Elliott C.). **Infection with the Flagellates.**—*New Orleans Med. & Surg. Jl.* 1921. Oct. Vol. 74. No. 4. pp. 232–244.

Of 112 private patients examined, 12 or 10·7 per cent. had a Trichomonas infection. Probably many people harbour these parasites without any harm resulting; on the other hand (so the author avers), they may produce a very severe, if not fatal, catarrh of the whole intestine. The remainder of this paper is of no scientific value.

P. H. M-B.

Block (M.). **Treatment of** *Trichomonas intestinalis* **with Methylene Blue.**—*Nebraska State Med. Jl.* Norfolk. 1920. Dec. Vol. 5. No. 12. p. 354. [Summarized in *Jl. Amer. Med. Assoc.* 1921. Jan. 22. Vol. 76. No. 4. p. 271.]

Methylene blue was given freely by the mouth and as a rectal irrigation—by the mouth in a total of 9 gr. daily, in three doses of 3 gr.; by the rectum in a dose of 10 gr. to the quart of hot water morning and evening. Rest in bed and liquid diet were enforced. This treatment was kept up for five days and resumed after a brief interruption for a similar period, after which the diarrhoea had subsided and the flagellates had disappeared.

P. H. M-B.

Noc (F.) **Les dysenteries et les entérites infectieuses et parasitaires.**—*Ann. de Méd. et de Pharm. Colon.* Paris. 1921. Jan.–Feb.–Mar. Vol. 19. No. 1. pp. 5–38. With 2 plates.

This paper, illustrated by two extremely poor plates of amoebae and the intestinal flagellates, is a review of the recent literature of dysentery, which has already been adequately reviewed in this *Bulletin*.

P. H. M-B.

SPRUE.

Hannibal (Edna A.) & Boyd (Mark F.). **The Monilias of the Gastro-Intestinal Tract in Relationship to Sprue.**— *Amer. Jl. Trop. Med.* 1921. May. Vol. 1. No. 3. pp. 165–180. With 4 text figs.

The material for this study consisted of five cases of undoubted sprue occurring in Texas. Details of three cases are given in addition to the two formerly reported (Boyd 1920). One was complicated by pulmonary tuberculosis; all except one had tongue symptoms, and three had patches of thrush on the buccal mucosa.

Thirty-four cases suffering from a variety of medical ailments were investigated as controls; monilias were isolated from seventeen. The method used for isolating these organisms from the faeces was similar to that described by Ashford. Routine tests were performed for every monilia isolated with seven carbohydrates in a basic medium of peptone water, viz., levulose, galactose, saccharose, mannite, maltose, lactose, and dextrose; the fermentation tests being recorded after five days, when they became constant. It was found that by using peptone water uniform results were secured, regardless of the length of time a strain had been under artificial cultivation; whereas meat extracts used as basis give by no means constant results.

Precise observations indicated that monilias isolated from 22 cases (5 sprue patients and 17 controls) conformed to the description of Ashford's *Monilia psilosis*.

A limited number of feeding experiments were made with guinea-pigs which suggested that in some instances this monilia could produce an acute gastro-enteritis. Yeast cultures corresponding to *M. psilosis* were recovered from cases of thrush, and their identity with that species appeared more than probable.

The conclusions arrived at as the result of this study are by no means decisive. On the whole they suggest that *Monilia psilosis* is not the cause of sprue, by reason of the fact that 50 per cent. of controls, including the thrush cases, were harbouring the same organism as was recovered from sprue. Some factor besides the mere presence of monilia in the intestinal tract is evidently at work in the production of sprue.

P. H. Manson-Bahr.

Birt (Ed.). **Amöben und Sprue.**— *Arch. f. Schiffs- u. Trop.-Hyg.* 1921. Vol. 25. No. 5. pp. 131–141.

This paper is a lengthy dissertation of the author's conviction, unsupported by any cited cases or experiments, that *Entamoeba histolytica*, or, rather, amoebiasis of the intestine, is the precursor of sprue. He states that in every case of sprue, sooner or later, blood and mucus containing the active amoeba is passed. Long-continued amoebiasis leads to a degeneration of the mucosa of the gut.

The mouth symptoms are said to be greatly alleviated by a mouth-wash containing emetine. For adults he finds the following treatment useful :—

℞.

Pulv.	salol	0·1 gm.
,,	resorcin	0·01 ,,
,,	emetine	0·01 ,,
,,	cocaine	0·01 ,,
,,	strychnine sulphate..	0·001 ,,

in pills three times a day after meals for ten days at a stretch. Dietetic restrictions are, of course, necessary. The majority of cases seen in Shanghai are of European origin, though the disease occurs also in Chinese.

[The reviewer has observed in one case during the last year symptoms of sprue supervening upon a long-standing amoebic dysentery.]

P. H. M-B.

Bovaird (David). **A Study of Tropical Sprue, or Psilosis.**— *Jl. Amer. Med. Assoc.* 1921. Sept. 3. Vol. 77. No. 10. pp. 753–757. (Discussion pp. 757–758.)

"Tropical" sprue may be found from Ceylon to Northern Korea, from Porto Rico to New Hampshire. Of the author's cases three were women and ten were men, their ages ranging from 37 to 57 years. Their sojourn in foreign parts before developing symptoms varied from two to thirty years. Two returned to America in good health, and first noted symptoms four months after their return.

The mouth lesions in sprue are of considerable variety, and none of them in any respect resembles the picture produced by *Monilia albicans*. From none of the aphthous ulcers of sprue has the author been able to isolate a monilia of any type. The specific organism causing the disease has not yet been discovered. Only once in this series of 13 patients has monilia been found in the stools. One case proved fatal, and showed various lesions, such as a specific aortitis, quite unconnected with the disease sprue. A chronic enteritis of the mucous type was present, and the pancreas was normal in gross appearance and in microscopic sections.

As regards the clinical phenomena, the author has never noted the shrinkage in the liver dulness upon which stress is laid by some writers; the liver but shares the loss common to all the viscera. Proctoscopic appearances are by no means characteristic; in some the mucosa was normal, in some it was pale, in others it was the colour of raw beef. Six only of twelve gastric analyses showed complete absence of hydrochloric acid. In four patients stool analysis showed total fat varying from 25 to 48 per cent. of the dried faeces; neutral fat constituted 11 to 35 per cent. of the total, an average of 24 per cent., the fatty acid from 65 to 89 per cent., an average of 75 per cent. Blood urea was found normal in two instances, as was also the carbon dioxide content.

Interest attaches to the tests for pancreatic ferments in the stools. Trypsin was absent in four cases and diminished in the fifth, but present in normal quantity in three. Amylose varied greatly. Tetany as a complication was observed in two cases. The author's experience leads him to doubt whether patients with well-developed psilosis ever recover. He is of the opinion that no sufferer from sprue should ever return to the tropics.

P. H. M-B.

Brown (Thomas R.). **The Absence of Pancreatic Secretions in Sprue and the Employment of Pancreatic Extract in the Treatment of this Disease.**— *Amer. Jl. Med. Sciences.* 1921. Apr. Vol. 161. No. 4. pp. 501–507.

The author comments upon the absence in literature of any reference to microscopical appearances of the pancreas in sprue. [This statement is hardly correct.] He considers it a matter worthy of investigation, as he has had an opportunity of studying five cases, in all of which

marked improvement took place after the administration of pancreatic extract, but the symptoms promptly reappeared when the extract was stopped. Quantitative estimations of the pancreatic ferments were made from stool analyses, and also from the duodenal contents abstracted by Einhorn's bucket. No pancreatic ferments—trypsin, lipase or diastase—were found.

Judging from pathological findings an enormous diminution of the intestinal ferments must take place in sprue, and the absence of trypsin, enterokinase, invertin and the duodenal hormones, and disturbances in the chemistry of the bile, all have an influence upon the secretion of pancreatic juice.

As regards gastric secretion the results were variable; one case showed hyperacidity, two subacidity and two hyperchlorydria.

The administration of large doses of pancreatin, or some form of pancreatic extract, 5–10 gr., with 20–40 gr. of calcium carbonate or calcium lactate, three times daily, was followed by rapid and remarkable improvement.

P. H. M-B.

CANTLIE (James). **Sys Powder and its Use in Sprue.** [Leader.]—*Jl. Trop. Med. & Hyg.* 1921. Sept. 15. Vol. 24. No. 18. pp. 244–246.

This leading article describes the treatment of sprue originally practised by an unqualified man—Peter Sys—in Shanghai. He withheld all food for 12 hours, and at the end of that period administered an ounce dose of castor oil. During the following 24 hours the patient was given a basin of chicken tea and one or two teaspoonfuls of a special powder supposed to be made of the ground internal shell of the cuttlefish. After cessation of the diarrhoea the patient was at once permitted to eat meat—by preference slightly underdone beefsteak. The original Sys powder can only be obtained in Shanghai, but a substitute has been put on the market under the name of Pulv. Batavia [a name originally bestowed by Sir Patrick MANSON]. The writer then repeats his well-known views as to the value of meat in the treatment of sprue.

P. H. M-B.

TROPICAL OPHTHALMOLOGY.

HOLLAND (B. T.). **Notes on 2,412 Eye Operations performed in a Month at Shikarpur, Sind, in Jany. and Feb., 1921.**—*Indian Med. Gaz.* 1921. June. Vol. 56. No. 6. pp. 212–213.

These operations were performed within a period of 29 days, several general surgical operations, not included in the review, having been performed during the same period.

Most of the work of the hospital for the year appears to be condensed and carried out within two months. The hospital staff consists of three doctors, one assistant surgeon and two nurses, with a compounder, two dressers and two theatre assistants. The greatest number of operations performed on one day was 186; these included 112 operations for cataract. Subconjunctival injections of saline are included in the return as operations.

One thousand two hundred and three operations for cataract were performed, the intracapsular operation being done in 95 per cent. of cases. Nine cases of sepsis occurred and eight cases of choroidal haemorrhage. This rather high percentage of complications is easily accounted for by the conditions under which the work was carried on. Holland emphasizes the importance of entering the knife at an angle to the surface with a view to avoiding the danger of splitting the layers of the cornea. The inclination of the knife is altered once the point has entered the chamber.

Two hundred and ninety-six operations were performed for entropion and trichiasis; 253 iridectomies were done, most of these being for corneal leucoma.

Subconjunctival injections of cyanide of mercury have been practically abandoned in favour of saline injections, which are found less painful.

R. H. Elliot.

NEVILLE (W. S. Thacker). **A Year's Work in an Eye Clinic.**—*China Med. Jl.* 1921. Mar. & July. Vol. 35. Nos. 2 & 4. pp. 128–131 & 369–377.

One of the most striking features of the writer's experience at Mukden was the amount of trachoma encountered. This disease was responsible for nearly half of the 2,287 admissions to the clinic, and the great majority of the trachoma patients suffered from serious complications. Pterygium is another common condition, being met with in 106 patients. One case is recorded in which a double pterygium was present, a growth springing from each canthus, the apices almost meeting each other at the centre of the cornea. Neville advises that in such cases the apex should not be dissected off the cornea, but that the tip should be left to atrophy after division of the neck of the growth.

Thirty-five cases of dacryocystitis were treated, so that this disease appears to be very common in the district; its frequent occurrence is possibly connected with the prevalence of trachoma. Excision of the sac was the usual treatment for the disease, local anaesthesia being employed. Neville justly emphasizes the danger of injecting adrenalin into the tissues during the administration of chloroform.

The number of cases of glaucoma seen (38), compared with those of cataract (47), is very remarkable, and shows a striking difference from the experience of Indian clinics. Smith's intracapsular expression was the operation performed in the treatment of cataract. As might be expected, most of the glaucoma patients had reached a very advanced stage of the disease.

Only 25 cases of fundus disease presented themselves, and 10 of these were affections of the optic nerve (four neuritis and six atrophy). Three cases of disseminated choroiditis were seen, and one of retinitis pigmentosa. This contrasts with Indian experience, in which disseminated choroiditis is a very rare disease and retinitis pigmentosa a very common one.

R. H. E.

Li (T. M.). **Diseases of the Eye.**—*Nat. Med. Jl. China.* 1921. June. Vol. 7. No. 2. pp. 40–52.

In this paper Dr. Li deals with the leading anatomical features of the eye, and compresses into tabloid form a description of the chief characteristics of such diseases of the eye as the general practitioner is likely commonly to meet with in China.

R. H. E.

Chih (Pa Ta). **Bacteriological Examination of Smears from 1,004 Consecutive Eye Cases.**—*Nat. Med. Jl. China.* 1921. June. Vol. 7. No. 2. pp. 52–54.

This paper is a report of the beginning of a research to determine the aetiological factors in the external inflammatory disorders of the eye, met with in a routine dispensary practice in China. The organisms found, and their frequency, were as follows: Morax-Axenfeld in 166 cases; staphylococci in 97; pneumococci in 95; Koch-Weeks in 66; xerosis in 29; unclassified in 28; gonococci in 9; streptococci in 7.

In 547 of the cases examined no organisms were discovered. Out of 361 cases of uncomplicated trachoma the examination was negative in 224 instances. No organisms were found in three out of four cases of dacryocystitis, whilst the staphylococcus was present in the fourth case. These facts show how essential it is to make a cultural examination before an opinion can be formed that the conjunctival sac is free from bacteria.

R. H. E.

Wilmer (A. J.). **Effects of Carbon Monoxide upon the Eye.**—*Amer. Jl. Ophthalm.* 1921. Feb. Vol. 4. No. 2. p. 73.

The increasing industrialism of parts of the Tropics lends considerable interest to this paper, which draws attention to the many sources of carbon monoxide production and to the evil effects of its inhalation in minute doses.

These sources are met with in such industries as deal with coal gas, producer gas, water gas and furnace gas; carbon monoxide is also obtained in considerable quantity from the exhaust of internal combustion engines.

Chronic poisoning is associated with general nervous symptoms, which, in some cases, may produce hallucinations and delusions. Children are more susceptible to its noxious influence than are adults. Poisoning by the gas may cause various disturbances of the functions

of the eye; amongst these have been noted: paralysis of ocular muscles, hemianopsia, amblyopia, and optic neuritis. Wilmer noted a marked contraction of the visual field and the presence of a paracentral scotoma in one of his cases; the patient suffered from an optic neuritis.

R. H. E.

Rathery (F.) & Cambessédès. **Amaurose quinique.**—*Bull. et Mém. Soc. Méd. Hôpit. de Paris.* 1921. July 21. No. 25. pp. 1142–1147. With 2 text figs.

The writers described the ocular changes which they observed in a case of quinine poisoning and discuss the condition.

The patient was a man, aged 41, who had contracted malaria whilst on military service in the East. He was in the habit of dosing himself with cachets, each of which contained 0·5 gm. of sulphate of quinine. Hoping to cut short an attack of fever, he took 18 of these cachets (a total of 9 gm. of quinine sulphate) between 8 a.m. and noon. Four hours after taking the last dose he developed vertigo and aural symptoms. After vomiting he went to sleep. That night, on waking about 12 o'clock, he found that he was completely blind. When brought to hospital he was found to have lost all vision and his pupils were observed to be greatly dilated; haemoglobinuria was present.

Two days after the drug had been taken some light-sense returned. An ophthalmoscopic examination was made on this date; the pupils were very widely dilated and quite inactive, the papillae were excessively blanched, and the arteries very small. Vision was slowly regained, and when it became possible to test the visual fields, these were found to be nearly concentrically contracted almost as far as the 10° circle. There was a very gradual improvement, both in the visual fields and in the acuity of sight, up to the time of the last note, made 38 days from the commencement.

When discussing the case, the writers conclude that the effects observed cannot be solely due to the vascular changes in the retina, but consider that a toxic influence is exerted on the retinal cells; these are possibly rendered more vulnerable by the effects of vaso-constriction.

The inhalation of amyl nitrite appeared to be beneficial in the treatment of the case.

R. H. E.

Blake (Eugene M.). **Ocular Changes in Infantile Scurvy.**—*Amer. Jl. Ophthalm.* 1921. Oct. Vol. 4. No. 10. p. 736.

This paper furnishes a short review of the aetiology and symptoms of infantile scurvy, with a description of some of the lesions found. Exophthalmos, due to haemorrhage into the orbit, is stated to be the most frequent and most striking ocular complication.

Blake describes a case of an infant who developed exophthalmos during the course of an illness diagnosed as "rheumatism." The right eye was markedly exophthalmic, but the motility was unimpaired. The eyeball was free from tenderness, and there were no haemorrhages into the lids or subconjunctival tissue. There were no pathological changes noticeable in the retina. The case rapidly improved once its nature was recognized and an appropriate treatment given.

R. H. E.

Roy (J. N.). **Des affections oculaires dans la syphilis et la trypanosomiase humaine chez les indigènes de l'Afrique.**—*Rev. Méd. et Hyg. Trop.* 1920. Vol. 12. No. 4. pp. 103–119.

This paper records observations made in the course of an extensive tour in Africa. After discussing the original source of syphilitic infection amongst the natives of Africa, the writer concludes that the disease was imported from Asia, and that the inhabitants of the Red Sea littoral and the north coast of the continent were first affected, the disease being handed on to the negroes by them. Europeans were largely responsible for the introduction of syphilis into the southern parts of Africa.

The black races who were in touch with the Arabs, Moors and Egyptians, were infected by them with trachoma as well as syphilis. Contrary to the statements of some writers, trachoma was found to be very common amongst the blacks of Northern Africa; destructive types of the disease, too, were just as common amongst these as amongst the other races. Trachoma is very rare, however, south of the fifth degree of latitude N., and does not exist in the region of the central forests.

Roy thinks that some of the African tribes have developed a certain degree of immunity against syphilis, and that the disease runs a very mild course in them; he claims to have previously observed a similar immunity amongst Asiatics and the inhabitants of South America. Ocular complications of the disease are quite infrequent amongst negroes, and, when they occur, seldom attack the structures of the posterior segment of the eye; this is so even when the syphilitic infection is very severe. He says that syphilis seldom attacks the central nervous system of the negro, and that tabes is practically unknown among the blacks of Africa; this disease, according to him, appears to be peculiarly the property of the white races. Roy suggests that it is possible that writers, who have found the negro highly susceptible to the ocular complications of syphilis, have not confined their observations to those of pure blood.

Roy states that African natives do not appear to suffer much from lesions of the eye in the course of an attack of trypanosomiasis, but he does not distinguish between the various forms of infection; this is a very important omission. He examined 418 negroes, who were suffering from sleeping sickness, and found swelling of the optic nerves in four cases; two of these were in the last stages of the disease, and the oedema was probably caused by increased intracranial pressure. Nineteen cases of simple white atrophy of the nerves were found amongst these 418 patients; the atrophy was attributed to the injection of atoxyl or similar arsenical drug.

R. H. E.

Gupta (H. Das). **A Case of Filarial Cyst on the Eye.**—*Indian Med. Gaz.* 1921. Sept. Vol. 56. No. 9. p. 338.

A male Mohammedan, aged 25, was seen a fortnight after the onset of severe pain in the eye. A small cystic tumour was found near the outer canthus. A gelatinous fluid escaped when the cyst was incised, and two fine white worms were found coiled together amongst the cyst contents. The worms were 1½ in. in length, one being slightly longer than the other. Unfortunately they were not identified. [It is of great importance that all such specimens should be sent to some recognized authority for identification. They should be placed as

soon as possible in 75 per cent. alcohol, to which 10 per cent. of glycerine has been added. Such material will always be welcomed by the Laboratories of the London School of Tropical Medicine, Endsleigh Gardens, N.W.1.]

R. H. E.

NICOLLE (Charles) & CUÉNOD (A.). **Étude expérimentale du trachome.**—*Arch. Instituts Pasteur de l'Afrique du Nord.* 1921. July. Vol. 1. No. 2. pp. 149–178.

The writers begin this paper by reviewing the work previously done by them during their investigations as to the kind of animal suitable for inoculation, and their researches into the properties of the virus of trachoma.

The second part of the paper refers to their more recent work, and deals with the development and duration of trachoma in the Algerian baboon (*Macacus innuus*), the experimental inoculation of the disease in the rabbit, the conservation of activity by the virus for a period of 37 days after having been injected into the testicle of a rabbit, the protection afforded by an experimental attack of the disease, after it had been cured, against a second inoculation, and experiments to show the part played by flies in the spread of trachoma.

They conclude (1) that trachoma virus, when inoculated in the baboon, can be made to produce a disease which exactly resembles human trachoma, both in its clinical manifestations and in its complications; (2) that the rabbit is susceptible to a modified form of the disease; (3) that trachoma virus can maintain its activity after having been retained in the testicular tissue of the rabbit for a period of at least 37 days; (4) that, in the case of the baboon and the rabbit, a cured attack of experimental trachoma affords no protection against a second experimental attack of the disease; (5) that a contaminated fly is infectious for a period of at least twenty-four hours, even though the virus may have been exposed to the ordinary atmospheric conditions —*e.g.*, on the surface of a rag—for a period of six hours before the insect settled upon it.

The authors lay some emphasis on the part played by flies in the propagation of trachoma, and they recommend that systematic fly destruction should be undertaken in hospitals where trachomatous patients are treated, and that the wards should be rendered fly-proof.

M. sinicus, *M. cynomolgus*, and *M. rhesus* were all found to be resistant to trachoma, but the Algerian baboon was found to be very satisfactory for experimental purposes.

Regarding the nature of the virus, they are of opinion that it is an invisible micro-organism, which can pass through a Berkefeld V filter; they consider that the bodies described by PROWAZEK and HALBERSTAEDTER are certainly constant in trachoma, but that their signification is doubtful and their specificity awaits proof. The virus is destroyed if it is kept at a temperature of 50° for half an hour.

The interesting suggestion is made that different infections may be confounded under the common term trachoma; such infections are due to invisible micro-organisms, indistinguishable from one another; these excite entirely similar reactions in the conjunctiva, causing the formation of granulations and leading to complications of similar type.

R. H. E.

Kirkpatrick (H.). **Some Points concerning Trachoma.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1921. Mar. 18 & May 20. Vol. 15. Nos. 1 & 2. pp. 35–51. With 9 text figs. (Discussion, pp. 52–53.)

The causation of trachoma is first taken up, and then in turn the pathology, the signs and symptoms, the diagnosis, and the treatment are discussed. One of the most important features of the paper is the reference to the large number of probably widely different conditions, which, at the present time, we include under the convenient term "trachoma." Kirkpatrick's method of ballooning the conjunctiva by means of a subconjunctival injection of fluid will be found to be a most efficient means of ensuring the complete exposure of the membrane for the local application of drugs, or for various minor surgical proceedings. Another original suggestion, and one which is warmly commended by those who have tried it, is the use of eye-baths of a saturated solution of magnesium sulphate. These are indicated in gonococcal and streptococcal infections. The whole paper is worthy of very careful study, and must be read in the original to be properly appreciated.

R. H. E.

Harford (Charles F.). **Trachoma among the Chinese in France.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1921. Mar. 18 & May 20. Vol. 15. Nos. 1 & 2. pp. 54–56.

In this paper Harford records his observations on the conjunctival conditions found in Native Labour Corps, made in the course of his service in France. The disease, seen amongst the Chinese coolies in the trachoma company, resembled the bad cases of muco-purulent conjunctivitis which occur in England, with the addition of some nodular elevations under the red, velvety conjunctiva. He has never heard of any case of trachoma arising in France among South African natives.

He is strongly of opinion (*a*) that the term trachoma is too loosely applied to cases of conjunctivitis in subtropical climates; (*b*) that the whole subject calls for the earnest attention of ophthalmologists and of all practitioners in these countries; and (*c*) that the governments concerned should make it the subject of searching enquiry.

R. H. E.

Michail (D.). **Recherches sur la pathogénie des récidives du trachome.**—*C. R. Soc. Biol.* 1921. May. Vol. 84. No. 19. p. 1036.

This short paper represents an extension of Michail's theory that the primary infection in trachoma attacks the lachrymal gland, and that the conjunctival changes, characteristic of the disease, are secondary to this infection. He states that relapses mostly commence at the outer angle of the upper fornix (in the region of the lachrymal gland), and that they are due to a chronic infection of the gland.

R. H. E.

Kazuo (Hiwatari). **The Diagnosis of Trachoma Granules upon the Limbus of the Cornea.**—*Amer. Jl. Ophthalm.* 1921. Mar. Vol. 4. No. 3. pp.

Kazuo states that every prominent ophthalmologist in Japan is agreed that the development of trachoma follicles, in the tissue affected by pannus, is a very rare event in that country. He points

out the difficulties in diagnosis, and suggests that, in some cases, the follicles may be drawn on to the limbus from other regions by the contraction of the trachomatous conjunctiva. He states that it is often difficult to distinguish small focal areas of inflammation on the limbus, due to secondary infections, from trachomatous follicles.

R. H. E.

Staicovici (N.) & Lobel (A.). **Enseignements recueillis au cours de la guerre sur 12,000 granuleux.** —*Arch. d'Ophthalm.* 1920. Nov. Vol. 37. No. 11. pp. 689–699.

The writers had an experience of some 12,000 cases of the disease. They recommend prolonged grattage with a cube of sugar, sterilized in alcohol, as having given them satisfactory results. The conjunctiva is first disinfected and is then anaesthetized by the instillation and the subtarsal injection of cocaine. The lid is thoroughly everted and held stretched in position on a hard rubber plate by a double hook, which is inserted close to the lid margin. The conjunctiva is then lightly rubbed with a cube of sugar, which had been previously sterilized by dipping it in alcohol, until a smooth, milky looking surface comes into view. The treatment is applied to the conjunctiva of the lower lid and that of the canthi, as well as to that of the upper lid and fornix. Great care should be taken not to injure that part of the retrotarsal fold which is free from disease. The false membrane, which forms after the treatment, is usually shed in about five days.

Oxycyanide of mercury in a 1 in 5,000 solution, protargol, 2 per cent. solution of silver nitrate and copper sulphate are used during the after-treatment. The authors also recommend massage of the conjunctiva with an ointment containing 30 per cent. of copper sulphate.

Subconjunctival injections of ½ cc. of 10 per cent. solution of dionine [ethyl-morphine] combined with ½ cc. of 1 in 3,000 cyanide of mercury are advised for the treatment of trachomatous ulceration of the cornea. Three injections, made at three-day intervals, were usually found sufficient.

Peritomy was employed for vascularized pannus, the bare area, left after the division of the conjunctiva, being rubbed with the sugar cube.

R. H. E.

Rush (Calvin C.). **Treatment of Trachoma.**—*China Med. Jl.* 1921. May. Vol. 35. No. 3. pp. 211–213.

Rush, in this paper, describes the methods of treatment that he has found of value. He recognizes the difficulty of diagnosing folliculosis from the early stages of trachoma, and states that follicles may be found in the outer part of the retrotarsal folds of the majority of the Chinese residents in Canton. He suggests that the action of the sun may be a possible cause of this folliculosis. [If this were correct one would expect to find the same condition amongst natives of India and other countries where the eyes are exposed to powerful glare. It would, therefore, appear likely that, though glare may be a contributing cause of the condition, other factors must be present. A constitutional predisposition and a tendency to infection, would have to be taken into account.]

Rush has found beneficial results to follow the judicious use of copper sulphate and the subsequent application of glycerite of

boroglycerin. The glycerite is applied after cocainization, and, when the upper lid is involved, it is rubbed into the conjunctiva with pressure. Copper sulphate has been found especially useful when pannus was present. This treatment is alternated with that by the glycerite. Nitrate of silver and other drugs have also been used as applications.

R. H. E.

Dimitry (T. J.). **The Tarsus made Pliable as a Cure for Trachoma.**—*Amer. Jl. Ophthalm.* 1921. Feb. Vol. 4. No. 2. p. 107.

The object of the writer is to cause an absorption of the infiltration which occurs in the deeper tissues in the course of trachoma, and at the same time to expel the contents of the trachoma follicles without giving rise to cicatrization or injuring the normal tissues.

Dimitry utilizes a heavy piece of copper wire, of the size used for street car cables. The rod is about eight inches long, and is bent slightly about two inches from its end; a thin layer of cotton wool is evenly twisted round this bent portion. The lid is everted, and, after moistening the wool with sterile water, the end of the rod is passed into the fornix beneath the everted tarsus. The tarsus is now compressed between the wool-covered rod and the thumb used to maintain eversion of the lid. The rod is, at the same time, rotated, so as to cause the tarsus to bend and to cause expression of the follicular contents. Repeated manipulations are made until all the follicles have been emptied. As a result of this procedure, the indurated tarsus becomes pliable and can be easily manipulated. If a general anaesthetic is employed only one sitting is required, whereas repeated treatments may be necessary if local anaesthesia is used. Dimitry points out the importance of eliminating any secondary infection as a preliminary measure and of maintaining a rigid asepsis during the whole proceeding.

R. H. E.

Fleck (Harvey K.). **Disciform Keratitis Secondary to Smallpox.**—*Amer. Jl. Ophthalm.* 1921. Aug. Vol. 4. No. 8. pp. 573–579.

Fleck records the case of a patient who, ten days before the appearance of a smallpox eruption, had a foreign body removed from her cornea, and during the course of the disease developed a spot of corneal inflammation, which resembled disciform keratitis, at the site of the injury. When the patient was first seen the eruption was in the papular stage and signs of the injury were just visible; twenty-one days later, when seen again, the patch of keratitis had developed.

The literature of the subject is reviewed, and the differential diagnosis is discussed. Findlay's observation is quoted that the usual time for the appearance of this complication is between the end of the second week and the end of the third week of the disease.

Fleck expresses the opinion that the corneal changes, that at times occur during the progress of a case of smallpox, are the result of a secondary infection, and that the corneal reaction is less severe because of the previous systematic reaction to the same toxin. He concludes that the indications are that disciform keratitis secondary to smallpox is a specific inflammation, probably as specific as the pustule itself.

R. H. E.

Macrae (Alex.). **Nodular Keratitis of South Arabia.**—*Brit. Med. Jl.* 1921. Nov. 5. pp. 739–740.

Macrae describes a peculiar affection of the cornea which he has met with amongst the natives of South Arabia. The disease is chiefly seen amongst seamen and those dwelling near the sea coast. Males and those of middle age are most often affected. The condition causes a dimness of vision, which is most apparent during the daytime, when the light is bright and the pupil is small. Both eyes are commonly attacked. The corneal changes are unaccompanied by any vascular reaction of the tissue or of the conjunctiva, nor does iritis occur. A little group of glassy nodules of various sizes, the largest having a diameter of about 1 mm. and projecting about the same distance from the surface of the cornea, is seen to occupy an area in or below the equatorial corneal meridian. Examined by focal illumination, they resemble a group of round-topped mountains on a raised map. The nodules are not always transparent, and some or all may be slightly white and opaque. The cornea between and around the spots may not be clear, but may show leucomatous change, or may even stain in parts with fluorescin.

The disease cannot be ascribed to any definite cause, but it is suggested that it may be the result of microscopic grains of salt or sand having been embedded in the superficial layers of the cornea. [This explanation is not easy of acceptance.]

R. H. E.

Wright (Robt. E.) **Blocking of the Facial Nerve in Cataract Operations.**—*Amer. Jl. Ophthal.* 1921. June. Vol. 4. No. 6. p. 445.

Wright has used this method of causing a relaxation of the orbicularis muscle in one hundred patients, who appeared likely to squeeze their eye violently during an operation for cataract.

An injection of 2 per cent. novocaine was made into the orbicularis five minutes before the patient was brought into the theatre. The needle was entered over the centre of the zygoma, and, following the line of the latter, was pushed to the pinna. The injection was made during the withdrawal of the needle. The needle was then turned and pushed in the opposite direction, but in the same line, to a point approximately below the centre of the eye, the injection being made on withdrawal as before.

This treatment was effective in all the cases, with one exception. No bad effects whatever could be attributed to the injection, but a warning is given to keep the infiltration away from the lids.

Wright draws attention to the description of similar methods by Van Lint and Villard, and supports the principle advocated by them.

R. H. E.

Green (A. S.) & Pacheco (Luna R.). **The Barraquer Intracapsular Operation.**—*Amer. Jl. Ophthalm.* 1921. Aug. Vol. 4. No. 8. p. 595.

The paper records impressions gained from a visit to Professor Barraquer's clinic at Barcelona. They note that Barraquer

attaches a great deal of importance to the vibrations transmitted by his instrument to the zonule, as he claims that they rupture the fibres of the zonule, and thus permit the extraction of the lens with the least possible traction upon the ciliary body. In private practice Barraquer is reported to operate upon patients in his office and to allow them to go home immediately afterwards. The writers were very favourably impressed by the operation, and conclude that, with slight modifications it will probably become the operation of the future. They issue a warning, however, that it is no operation for an amateur to undertake, since, in the first place, a proper instrument is essential, and, in the second place, the highly developed skill and technique that is required in all cataract operations, is even more necessary in this.

R. H. E.

Maynard (F. P.). **Glaucoma and Epidemic Dropsy.**—*Indian Med. Gaz.* 1921. Aug. Vol. 56. No. 8. pp. 281–282.

This paper is an addition to Maynard's previous note upon the subject, and in it he records 104 cases of glaucoma that occurred in patients who were suffering from epidemic dropsy, and which were apparently connected with the general disease.

Eighty of the cases occurred in males and 24 in females. The age of those affected was strikingly young, the average being under 35 years; only 19 patients were above 45 years. The blood pressure, taken in 35 cases, was found to be decidedly raised; 73 patients complained of coloured haloes round lights. Of the classical signs of glaucoma, shallowness of the anterior chamber, dilatation of the pupil and ciliary injection were infrequent; moderate increase of tension, steamy cornea, contraction of the field of vision, and pathological cupping were the main symptoms met with, and these left no doubt as to the glaucomatous nature of the disease.

Trephining was found to be the most satisfactory form of treatment.

R. H. E.

Ubaldo (A. R.). **Clinical Forms of Panophthalmitis observed in the Philippine General Hospital.**—*Philippine Jl. Sci.* 1920. July. Vol. 17. No. 1. pp. 65–69.

Ubaldo furnishes statistics of 70 consecutive cases of panophthalmitis in the Philippines. He divides his cases thus: Infections from corneal ulcers, resulting from injury by rice stalks, grass, hemp, and the sharp edges of leaves, 15.

Infections from trauma, the result of injury by nails, bamboo sticks, finger-nails, cinders, dust and other foreign bodies, 10.

Infections from inflammation of old lesions, predisposed to by undue exposure of the eyes (staphylomata, facial paralyses, exophthalmic goitre, etc.), 10.

Endogenous infections, 35.

He discusses the rival merits of enucleation and evisceration, and thinks that the former should be reserved for the earlier cases, and the latter for the later more septic ones.

[With reference to his good fortune in so far escaping a fatal result after enucleation, the reviewer would sound a note of warning to the young surgeon in the Tropics. Whatever may be the verdict of Western practice, he is satisfied that it is dangerous to enucleate as a routine measure in the violent septic cases so commonly met with in tropical practice; and he would venture to predict that no surgeon who does a large number of enucleations for panophthalmitis, will indefinitely escape a fatal accident. With regard to his comment on DE SCHWEINITZ' case, in which uveal tissue had been left behind, it is hardly necessary to emphasize the very great importance of removing every scrap of this tissue in an evisceration and of thoroughly sterilizing the cavity left with a powerful antiseptic, such as tincture of iodine or 1 in 200 biniodide of mercury solution.]

R. H. E.

DENGUE AND UNCLASSED FEVERS.

COUVY (L.). **Dengue : Constatation de spirochètes dans le sang.** —*Bull. Soc. Path. Exot.* 1921. Apr. 13. Vol. 14. No. 4. p. 198.

The author notes that in an epidemic of dengue in Beyrouth, Syria, which attacked practically the whole population, direct examination of the blood showed the presence of short slender spirochaetes having two or three turns and fine extremities. These were only present when the blood was taken two or three hours *before* the onset of the fever; never during the course of the pyrexia or after the temperature had fallen.

It is not stated whether the organisms were detected by dark-ground illumination in fresh blood or in stained specimens. CRAIG has suggested, from the analogy with yellow fever, that spirochaetes might be cultured by NOGUCHI's method.]

P. W. Bassett-Smith.

COUVY. **Etiologie de la fièvre à phlébotomes.**—*Bull. Soc. Path. Exot.* 1921. Oct. 12. Vol. 14. No. 8. pp. 447–448.

In a letter dated June, 1921, the author reported that he had found spirochaetes in the blood three hours and twenty-four hours after the onset. He here describes more particularly the clinical characters of the fever, the most important points being the severe onset, the pharyngeal exanthem, the two or three-day fever followed by slight relapse on the seventh day, and often a repetition of the symptoms in a mild form during the fifth week. The asthenia was very marked and often prolonged. The incubation period was at least five days, and cases at the commencement of an epidemic were less severe than those at the end.

P. W. B-S.

CLAPIER. **Endémicité, sur l'Oubangui, de fièvres rappelant la dengue.** —*Ann. de Méd. et de Pharm. Colon.* Paris. 1921. Jan.–Feb.–Mar. Vol. 19. No. 1. pp. 94–107. With 4 text figs.

At Oubangui, in French Equatorial Africa, a number of cases of so-called climatic fevers of doubtful origin are met with, having clinical resemblances to dengue, seven-day fever, and sand-fly fever; the mild cases closely correspond with the *fevrier asthenomyalgic* of N. BERNARD.

The author gives the clinical notes of ten cases and discusses the etiology. The eruption is very like that of measles, is generalized, and spreads from above downwards, lasting two or three days; the pains are well marked, and adults are most affected. Though endemic, the disease can hardly be called epidemic; most of the whites contract it, but it is also present among the natives. The fever lasts a short time—three to six days—the saddle-back type is found, and it is followed by asthenia for some time after convalescence. The author, who suffered from the fever himself, concludes that it resembles most the slight forms of dengue. The carrier is uncertain. *Phlebotomus rondani* is found in Oubangui, but *Culex* and *Stegomyia* exist in more or less large numbers.

P. W. B-S.

Corson (J. F.). **A Case of Fever resembling Dengue occurring at Accra, Gold Coast. Notes of some other Similar Cases.**— *Jl. Trop. Med. & Hyg.* 1921. Oct. 1. Vol. 24. No. 19. pp. 253–254. With 1 text fig.

The occurrence of dengue-like cases on the Gold Coast is not infrequent, and the author's description of his cases is interesting. In these the pyrexia appeared to have been fairly severe and the rash very marked. No causal agent was observed and no epidemiological notes are given.

P. W. B-S.

Davies (L. Wynne) & Johnson (W. B.). **Notes upon the Occurrence of a Twelve-Day Fever of Dengue Group in Nigeria.**— *Jl. Trop. Med. & Hyg.* 1921. July 15. Vol. 24. No. 14. pp. 189–192. With 8 charts in text.

The cases occurred in the months of July to October, 1920, in the Northern Province of Nigeria. Notes of 15 Europeans and 3 natives were taken. The cases were scattered, and did not appear to be infectious. The illness was severe, and convalescence was protracted, but there were no deaths. The incidence of cases corresponded roughly with the rainy season, and pointed to a mosquito as the infecting agent, probably one of the *Culex* group. The temperature charts do not show the saddle-back type of dengue, and arthritic swellings were not noticed. It is noted that similar cases have occurred sporadically in Nigeria during the past few years.

P. W. B-S.

Megaw (J. W. D.). **A Note on the Twelve-Day Fever of Nigeria.**— *Indian Med. Gaz.* 1921. Oct. Vol. 56. No. 10. pp. 371–373.

The author gives a critical summary of Davies & Johnson's paper. He was struck by the resemblance of this fever to that of the Kumaon fever of India, and considers that it was not a form of dengue, for the following reasons:—The duration was too long, the temperature chart showed no evidence of primary and secondary waves, the onset and termination were less rapid, the rash was very unlike and too persistent, and there was no definite leucopenia; also there were no epidemics. He suggests that the Nigerian cases should be placed among the typhus-like group of fevers. As the epidemiological facts were against louse infection, and rather in favour of ticks as "carriers," the reasonableness of this view is increased, though the possibility of transmission by other arthropods, such as mites, must be remembered.

Further investigation in Nigeria on these lines is therefore required to clear up the etiology of the disease.

P. W. B-S.

Megaw (J. W. D.). **A Typhus-like Fever in India, possibly transmitted by Ticks.**— *Indian Med. Gaz.* 1921. Oct. Vol. 56. No. 10. pp. 361–371. With 7 charts in text.

In this interesting article the author describes fully and discusses very ably the characters of a peculiar fever found in the Himalayan regions of India, particularly at Bhim Tal and Sal Tal, 4,500 feet up in the Kumaon division, and he compares this with other typhus-like fevers which have been reported from various geographical areas widely separated. He first gives an abridged report of an unpublished paper

by Col. McKechnie on the fevers observed by him in 1913 in the same Indian area, which in the end he was reluctantly convinced were forms of typhus and not paratyphoid. The author then describes cases observed by himself, Sprawson, Hardy, and others, including his own illness [see this *Bulletin*, Vol. 9, p. 489], and brings forward strong arguments to show that the Kumaon fever has a close relationship with Rocky Mountain fever and is probably conveyed by ticks, of which there was good evidence in his own case and much probability in others. The disease was but little infective, whites were frequently attacked, the virulence was slight ; but the fever generally lasted about twelve days, and the rash was very marked. It is most often mistaken for some form of paratyphoid, but in recorded experiments the specific agglutinins have been very low or absent for these organisms. The author gives the following useful provisional classification.

Typhus Group.

Louse Typhus.	Tick Typhus.	Mite Typhus.
A louse-borne disease of filth, crowding, poverty :—	A disease of open-air life in the wilds :—	A disease of recently flooded places :—
A. Severe typhus (mortality high).	A. Rocky Mountain fever :— (1) Montana type (high mortality —60 per cent.). (2) Idaho type (low mortality —18 per cent.).	A. Tsutsugamushi (high mortality—up to 55 per cent.).
B. Mild typhus or Brill's disease (mortality low).	B. (?) Tick typhus of Kumaon and other places in India (low mortality—about 5 to 10 per cent.).	B. Sumatra tick typhus (low mortality).
C. Tabardillo or Mexican typhus.		

Prophylaxis depends on the determination of the " carrier " that spreads the disease. If the theory be true that it is a disease affecting animals of the jungle, communicated by ticks, like Rocky Mountain fever, then further research work on these lines is urgently required and precautions against tick bite infection are worth carrying out, with the extermination of the mammalian host, which method has been found so successful in the Rocky Mountains.

The paper should be carefully read by all interested in the subject.

P. W. B-S.

Coppin (H.). **Sur une fièvre épidémique du Tonkin rappelant le typhus exanthématique.**—*Bull. Soc. Méd.-Chirurg. Indochine.* 1921. July. Vol. 12. No. 1. pp. 66–82. With 4 charts.

The author gives his experiences of a number of cases of a peculiar fever treated at the special hospital of Ching-Vong between February and June, 1921. The great majority came from the prison of Hanoi.

There were altogether 108 cases, seven of which were males, with 18 deaths, or 16 per cent. The fever was provisionally diagnosed as influenza, but later was considered to be typhus of an irregular type. The clinical characters are very well described, and the difficulties of diagnosis are pointed out. The absence of efficient laboratories, negativing investigation by Weil-Felix and appropriate animal tests, is deplored. The congestion of the eyes, prostration, character of the fever, nervous symptoms and eruption (found in 16 cases, seven of which were fatal) suggested that the epidemic in Tonkin was a form of typhus similar to that of Nhatrang in 1908, described by Yersin. The patients had changed their clothing twice before they reached the hospital, so that it cannot definitely be stated that they were free from lice originally.

P. W. B-S.

Watson (O. P.). **A Note on Four Cases of Infection with** *Bacillus faecalis alkaligenes.*— *Jl. Roy. Army Med. Corps.* 1921. Aug. Vol. 37. No. 2. pp. 143–145.

In these four cases of fever, although *B. faecalis alkaligenes* was isolated from the blood, the author gives reasons for believing that it was not the true cause of the fever, the chief being that in all the cases, the serum of the affected gave only a low agglutination titre to the organism and a much higher one to others of the typhoid group. This view is strengthened by the fact that the control sera of men in the depot, convalescent from established enteric diseases, generally gave a like reaction, and that in one of the four cases *B. typhosus* was isolated from the faeces and the man was evidently a "carrier." Possibly *B. faecalis alkaligenes*, already present in the intestine, is stimulated to increased activity by the presence of other organisms of the enteric group, as is known to happen with *B. coli communis*, and so gains admission into the blood stream.

P. W. B-S.

Bernard (P. Noël). **Sur un microbe pathogène isolé au cours d'une fièvre de cause inconnue en Cochinchine (étude clinique et expérimentale).**— *Ann. Inst. Pasteur.* 1921. July. Vol. 35. No. 7. pp. 450–486. With 7 text figs.

From the blood of 92 cases of the climatic fever found in Indo-China, variously described as pseudo-dengue, five-day, and seven-day fever, a spore-bearing organism was isolated, the characters of which are here fully given. It was not pathogenic in itself, but appeared to be associated with an unknown germ ; that is to say, it was a saprophytic microbe capable of activity in various pathogenic states. It produced in young pigs an infectious disease transmissible by the faeces ; the course might be benign, or severe with marked nervous and gastro-intestinal symptoms. It has not yet been definitely ascertained whether the organism is distinctive of any single clinical disease, or even whether it has a specific action. The bacillus is called *B. asthenogenes*, it is very pleomorphic, is flagellate like *B. typhosus*, forms oval, central spores very rapidly, stains by Gram, is easily cultivated, haemolyses red cells, is killed with difficulty (120° C.), and produces a toxin active against pigs, rabbits and mice. It has many of the characters, cultural and bio-chemical, of *B. megatherium* (de Barry). The organism was isolated 92 times out of 212 blood cultures examined in the Institut Pasteur at Saigon, 31 times in Europeans and 61 in natives. The

bacillus was also found in the viscera and urine of two fatal cases. The same organism was very commonly recovered from rice. The conditions produced in young pigs, rabbits and mice are very fully described ; in the former it gave rise to symptoms similar to those in man. A preliminary report of the disease has already been given, but much further work is required to establish the etiological importance of the organism.

P. W. B.-S.

Loughnan (W. F. M.). **Pyrexia of Uncertain Origin in Jamaica.**—*Jl. Roy. Army Med. Corps.* 1921. May. Vol. 36. No. 5. pp. 383–387. With 3 charts.

Cases of mild pyrexia of short duration are frequent in Jamaica ; these are generally classed as P.U.O. They often occur in little epidemics in the hot weather, but are found in any month ; clinically they are similar in many cases to the local fevers of Bombay ; others are like phlebotomous fever. No cause was ascertained, and phlebotomous flies were said not to be present. Fresh arrivals are very susceptible to the disease, and the incidence of cases is greatest at sea-level and in the neighbourhood of any arid sandy soil, as at Port Royal.

P. W. B-S.

McDonald (W. M.). **Some Aspects of Differential Diagnosis in Tropical Fevers.**—*Jl. Trop. Med. & Hyg.* 1921. June 1. Vol. 24. No. 11. pp. 153–155.

The author, working at St. John's, Antigua, points out how difficult at times the diagnosis of tropical fevers may be, and that even malaria may in practice show few of the cardinal signs and symptoms of text-books. He emphasizes two facts from his own experience, namely, that a practitioner in the tropics is handicapped almost always by the fact that patients, when they seek advice, have generally taken much quinine and so have cleared the peripheral blood of parasites, and, secondly, that in subtertian malaria parasites are particularly few or difficult to detect. He cites malaria, filaria, typhoid, paratyphoid, worms, pulmonary tuberculosis and influenza as being the most common causes of fever, and appends a table which gives the "pointers" for differential diagnosis shown by examination of the peripheral blood.

Table.

1. Absence of eosinophiles, combined with leucopenia and a high Arneth index	Typhoid, paratyphoid.
2. Increase of large lymphocytes. Decrease of small lymphocytes and polynuclears. Eosinophiles normal. Anisocytosis and "brassy" cells. Arneth index normal or low	Malaria.
3. Polynuclear leucocytosis, 80 per cent. or over.	Septicaemia, abscess, pneumonia, meningitis.
4. Moderate increase of polynuclears and eosinophiles. No anisocytosis	Filariasis.
5. Approximately normal. Blood picture with high Arneth index	Pulmonary tuberculosis.
6. Marked eosinophilia	Ankylostomiasis and other worm infections.

P. W. B-S.

JAPANESE RIVER FEVER.

HAYASHI (Naosuke). **Etiology of Tsutsugamushi Disease.**— *Jl. Parasit.* 1920. Dec. Vol. 7. No. 2. pp. 53–68. With 3 coloured plates.

This disease has been proved to be conveyed by a minute red mite (*Leptus akamushi*, Brumpt) an ectoparasite of field mice which freely attacks human beings in the endemic area. The author has previously [see this *Bulletin*, Vol. 15, p. 25] described minute rod-like granules in the blood and cells of the infected. In this paper he gives details of his very thorough work on the life-history and morphology of the parasite, which appears to pass through a vegetative and generative cycle in the red blood cells and endothelial cells very similar to that described by WOLBACH for the parasite of Rocky Mountain fever. It differs from that of African cattle fever in the fact that both forms of development can take place in man, and the interposition of a secondary host or carrier is not always necessary, though general under natural conditions. Histological studies and animal experiments have been made with much patience for many years, so that the author speaks with authority. He has provided three very beautiful plates showing the various stages of the parasite, as seen when stained with Giemsa (Prowazek's trachoma granule stain); this brings out the chromatin substance and the characters of the parasite most clearly.

Summary.

1. Minute bodies, described as "rod," "spheroid," and "ring-shaped," have been found in the lymphocytes of lymph nodes and in mononuclear endothelial phagocytes of the spleen and lymph nodes, and in the region of the bite in patients suffering from Tsutsugamushi disease. They also occur free in the blood plasma, and in severe cases in the red cells.

2. The disease has been transmitted experimentally to monkeys, guinea-pigs, rabbits, and calves. Bodies similar in appearance and distribution to those found in human cases, have been demonstrated in experimentally infected animals.

3. These bodies, on account of the difficulty of differentiating their cytoplasmic and chromatic elements, resemble bacteria, but no evidence of their bacterial nature has been obtained from cultural or animal experiments.

4. Cultural experiments have proved wholly negative.

5. Microscopically, these bodies are found to possess definite morphology, with parts comparable to the nucleus and cytoplasm of a cell. Moreover, the three principal types in which they appear (rod, spheroid, and ring shapes), merge into each other. From these facts, it is concluded that the organism in question is a protozoon. Bodies of different sizes represent different stages in its life-cycle.

6. Biologically, this protozoon is to be considered as a new species, resembling but showing differences from *Bartonella bacilliformis* and *Theileria parva*. The parasite to which it appears most closely allied is *Theileria parva*.

7. The organism found in Tsutsugamushi disease, I have designated tentatively as *Theileria tsutsugamushi*, spec. nov.

P. W. Basset-Smith.

KAWAMURA (Rinya), HATTORI (Teikichi) & YAMAGUCHI (Shōdō). [**Preventive Treatment of Tsutsugamushi Disease.**]—*Tokyo Iji Shinshi* (*Tokyo Med. News*). 1920. Apr. 10. No. 2172. pp. 707–712.

Inunction of mercury, the internal use of potassium iodide, or injection of tuberculin do not succeed in preventing the attacks of Tsutsugamushi disease. Immediate removal of the part bitten by the

Trombidium has many difficulties in practice. The present authors tried both to destroy the mites from the affected soil and to defend the body from their attack. Among numerous drugs experimented with, both neozol and cresol-soap solution are effective, but petrol emulsion is the least expensive and quite effective in killing the mites. If 100 per cent. solution of the latter is sprinkled on the soil so as to penetrate three to four inches deep it will kill all imagines and nymphs of Trombidium. On the other hand, spraying of 100 per cent. solution of neozol or desinfectol upon the body and clothes is very simple and successful. The authors applied the above method to the labourers engaged in riparian work in an affected district. The soil was treated for 59 days, and among the labourers, numbering 89·1 per day on an average and treated for 44 days, not a single case of the disease has been found.

Hiroshi Ohshima.

BERIBERI.

i. Eijkman (C.). **Zilvervliesrijst of aan vitaminen rijke bijvoeding?** [Unpolished Rice or Accessory Food Rich in Vitamins?]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1920. Vol. 60. No. 4. pp. 489–493.

ii. Schüffner (W.). **Zilvervliesrijst of aan vitaminen rijke bijvoeding?** [Same title.]—*Ibid.* No. 5. pp. 779–788.

iii. Salm (A. J.). **Nog eens over beri-beri en de voeding.** [Further about Beri-beri and Food.]—*Ibid.* 1921. Vol. 61. No. 1. pp. 97–108.

iv. Kuenen (W. A.). **Opmerkingen naar aanleiding van de beschouwingen van Dr. A. J. Salm over beri-beri en voeding.** [Remarks relative to the Views of Dr. A. J. Salm on Beri-beri and Food.]—*Ibid.* pp. 109–117.

v. Horst (M. D.). **Is verstrekking van zilvervliesrijst aan indische militairen mogelijk en noodzakelijk?** [Is it Possible and Necessary to supply Unpolished Rice to (Dutch East) Indian Soldiers?]—*Ibid.* No. 2. pp. 119–122.

In October, 1918, the issue of unpolished rice to the army in the Dutch East Indies, which had been introduced a few years before to combat beriberi, was stopped on account of the apparent aversion of the native soldiers to this ration, which was, in their opinion, an inferior food. Since then the soldiers have received polished rice, and besides that (partly in substitute) articles of food richer in vitamins.

This has induced some well-known authorities on the subject in the Dutch East Indies to take cognizance of this policy.

i. Eijkman points out that the Javanese, above all, wants to eat his fill with rice, and will not get accustomed to European food (bread, potatoes, vegetables) in any large quantities. Past experience in the native naval force (1874) has clearly shown this. Everywhere the difficulty is recognized of supplying a sufficient quantity of vitamins in a palatable form to a rice-eating population if only polished rice is available. On the other hand the withdrawal of such accessory articles of food does not cause any harm if only unpolished rice is supplied (according to the experience of Schüffner and Kuenen among the Chinese coolies of the Senembah Tobacco Company on Sumatra's east coast. *Arch. f. Schiffs- u. Tropenhygiene.* 1912. Vol. 16. p. 292). With the unpolished rice the consumer gets at the same time the necessary amount of vitamins to protect him against deficiency disease, whilst this protection is left to his own taste and goodwill when the main food consists of polished rice.

ii. Schüffner supports Eijkman's opinion. White polished rice ranks higher in the estimation of all classes than the unpolished sort. Schüffner is of the opinion that reform in this respect should commence among the higher classes, and admits that such cannot be expected from the native soldier, though he quotes a striking exception concerning Banka, where the Chinese coolies have been thoroughly convinced of the superiority of unpolished rice as a foodstuff. Schüffner relates how the native labourer of Sumatra's east coast could practically be kept free of beriberi by using market rice from Rangoon, containing 0·4 per cent. and 0·45 per cent. P_2O_5 of the dry substance (0·9 per cent. in the whole grain), which still suffers a loss by washing, etc., the meal, when prepared, containing about 0·3–0·35 per cent. P_2O_5. By the use of this rice, however, the population was continually kept on the verge of beriberi, which disease

appeared here and there from time to time under the influence of special circumstances. During the war the planters had to take any sort of rice, including the polished brands, and beriberi occurred again in severe epidemics. In 1918 the rice stock became so scarce that its supply to the coolies had to be partly replaced by maize, sweet potatoes, etc., by which measure beriberi temporarily disappeared (as on no previous occasion). It appears that a certain degree of polishing of the rice can be allowed for, if care be taken that it is not accompanied by a loss of pericarp leaving less than a quantity corresponding to 0·45 per cent. P_2O_5. The appearance of this rice is considerably improved in comparison with the unpolished sorts, and is likely to be taken by the native soldier without any objection.

iii. Salm quotes two epidemics of beriberi occurring in prisons in the district of Kediri (Java). At Trenggalek an epidemic occurred in December, 1918, when only maize was supplied to the prisoners, whereas under the same feeding no beriberi was reported from other prisons in the district. The procuring of unpolished rice put an end to this epidemic.

At the principal town, Kediri, the prison dietary contained equal parts of rice and maize; the rice was of a bad quality, and a supply of fresh unpolished rice stopped the epidemic. Both epidemics were of little consequence.

Salm concludes that as beriberi occurred in only two of the prisons, and that in each only a small number of cases was reported, therefore besides the deficiency there must be another factor to cause an outbreak of this disease. He thinks that further study is necessary to clear up the beriberi problem; he also emphasizes the difficulties met with in issuing unpolished rice to the soldiers, which he considers only to be necessary if special danger of an outbreak of beriberi exists.

iv. Kuenen points out that Salm neglects the incubation period of beriberi. The bad rice supplied at Trenggalek before December, 1918, was probably the cause of the beriberi, not a supposed deficiency of the dietary at the time of the outbreak of the epidemic. Only a part of the prisoners contracted beriberi; the higher the degree of metabolism, the sooner deficiency becomes apparent—this may explain the fact that Salm's cases occurred only in well-nourished prisoners. There is no reason to accept the existence of other important factors besides the deficiency in diet to explain the outbreaks of beriberi. In the army the procuring of polished rice would mean a shortening of the incubation period of beriberi if special danger of an outbreak of this disease should arise (for instance, by want of accessory food articles and a higher degree of bodily exertion during expeditions, etc.).

v. Horst pleads the necessity of unpolished rice. He quotes his experience at Balik Papan, where he was able to stamp out beriberi by issue to the coolies of a mixture of two parts polished and one part unpolished rice. [This may prove difficult in practice, because in some cases the different sorts of rice require a considerable variation in time of steaming or cooking.]

W. J. Bais.

Johnson (J. M.) & Hooper (C. W.). **Antineuritic Vitamine in Skim Milk Powder.**—*Public Health Rep.* Aug. 26. Vol. 36. No. 34. pp. 2037–2043. With 8 charts in text.

The investigation was to determine whether skim milk powder as prepared by the spray process contained water-soluble vitamin and

to ascertain the amount necessary to prevent polyneuritis in pigeons. A pigeon fed on polished rice and milk powder was found to require 30 per cent. of food in the form of skim milk powder to get full protection, which was equal to about 75 cc. of fresh milk daily. It was calculated that a child of 4·5 kilo body weight would require 1,125 cc., about 2 pints, of reconstructed milk daily to provide sufficient of the antineuritic substance.

P. W. Bassett-Smith.

Murata (M.). **Beriberi-like Disease in Mammalian Animals.**—*Japan Med. World.* 1921. June 20. Vol. 1. No. 2. pp. 12–14.

In an experiment in which rabbits were fed on a diet of polished and unpolished rice, straw and water, 44 out of 147 showed evidence of beriberi-like disease. The symptoms were characteristic after 80 days, with paralysis of the hind legs. If given a diet rich in vitamin B after the onset of the symptoms they generally recovered, but not so rapidly as do birds. The animals received a certain amount of vitamin in the food, but it was not enough for their needs, and a condition of hypovitaminosis was present which produced the beriberi-like symptoms; a similar state, according to the author, is present in human beriberi. He believes that the beriberi-like diseases of animals are identical with human beriberi from an etiological point of view, presenting either a condition of avitaminosis or hypovitaminosis.

P. W. B-S.

Kato (G.), Shizume (S.) & Maki (R.). **The Nature of the Paralysis of Nerve, in the Birds, of Beriberi-like Disease.**—*Japan Med. World.* 1921. July 15. Vol. 1. No. 3. pp. 14–19. With 2 text figs.

The experiments were made on chickens fed with polished rice. The report is difficult to follow and very technical. The velocity of the impulse along beriberi nerves was found to be less than the normal; in starved chickens there was no difference noted. In birds that had been paralysed and cured by extract of bran there was no retardation of the impulse; the functions of the nerves were thus entirely recovered in a few hours. The authors then proceed to show that rice bran extract cures the nerve paralysis by its action on hydrogen ions; that it has a wonderful power to make a large amount of hydrogen ions inactive, and that in the diseased nerves the hydrogen ions are adsorbed. They conclude that the nerve paralysis in chickens produced by a polished rice diet is due to adsorption of hydrogen ions by the nerves.

P. W. B-S.

Ogata (Tomosaburo). **Referat ueber Reiserkrankung des Geflügels (kakkeähnliche Krankheit oder Polyneuritis gallinarum).**—Reprinted from *Verhandlungen der Japanischen Path. Gesellschaft.* 1920. Apr. 3. 75 pp.

The author first gives a short historical sketch of antineuritic food experiments on birds by different investigators, from which it is apparent that no agreement as to the causation of polyneuritis gallinarum has been reached. He then compares the signs, symptoms and pathological anatomy of birds affected with "rice disease" (a term preferred by him to those in general use) with those of birds fed on other dietaries, and concludes that rice disease could be produced only by carbohydrate feeding. His final conclusion from all his observations

is that the polyneuritis of birds and the polyneuritis of rice disease are not altogether the same, since the most momentous changes in rice disease are not in the nerves, but in the endocrine organs. The islands of Langerhans are much hypertrophied and their function is increased, but not till after the onset of the symptoms, showing an increased demand on these cells when the disease commences. There is a hypertrophy and hyperplasia of the adrenals, particularly of the medulla, but it is doubtful if there is an increase in function ; it appears that these changes are associated with those in the pancreas. The increased functions of the endocrines is compensatory, as the increase does not appear until after the onset of the disease. Vitamin B is essential together with the hormones of these glands for carbohydrate metabolism.

If vitamin B is wanting, hypertrophy may go on to atrophy, which is best seen in the pancreas of hens which had been given the disease three times. This raises the question whether chronic lack of vitamin B with excess of carbohydrate might not ultimately cause diabetes. The findings as to the respiratory quotient show that in the absence of vitamin B the carbohydrate is not completely broken down to CO_2 ; on the other hand the urates in the urine are increased when the disease begins, thus showing that protein continues to be oxidized, even in greater quantity than before, in an attempt to compensate for the lack of energy derived from the carbohydrate. Thus oxygen continues to be absorbed while CO_2 is not excreted correspondingly. Hyperglycaemia and glycosuria appear when the R.Q. falls, and at the same time diminution of the glycogen content of the liver appears, as in pancreatic diabetes.

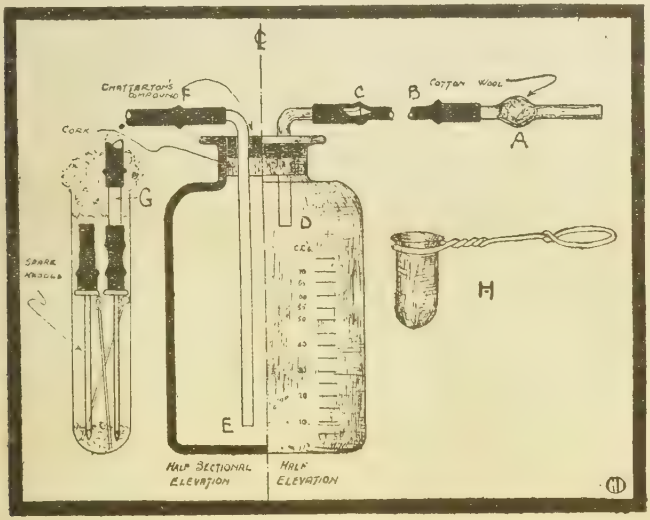
In the author's observations there were many features constantly found in "rice disease" which hardly ever occur in human beriberi. The relationship between diabetes, beriberi and "rice disease" is a very interesting one and requires further study ; the last named the author defines as a disturbance of carbohydrate metabolism caused by the intake of carbohydrate with insufficiency of the vitamin B, which is essential for proper carbohydrate metabolism.

P. W. B-S.

MISCELLANEOUS.

WILLMORE (J. Graham). **Note on a Simple Apparatus for taking Blood-Culture, giving Subcutaneous or Intravenous Injection, and collecting Antitoxin.**— *Jl. Trop. Med. & Hyg.* 1921. July 1. Vol. 24. No. 13. pp. 176–178. With 1 text fig.

"For many years the writer was constantly faced with the necessity of taking blood-cultures, or giving injections of antitoxin or saline solutions, in the desert where the usual apparatus were often not to be obtained, and when contamination from dust and sand storms was especially troublesome. The apparatus which forms the subject of this note was found to fulfil the desiderata required, in that it consists of materials which can be obtained and transported anywhere, put together in any field laboratory, and is so designed that at no time during its manipulation does the blood, the culture medium, or the fluid to be injected come into contact with unfiltered air.



Apparatus for taking Blood-Culture, giving Subcutaneous or Intravenous Injection, and collecting Antitoxin. [WILLMORE.]

[Reproduced by permission from the *Journal of Tropical Medicine and Hygiene*.]

"As shown in the accompanying illustration, the apparatus consists of a container, which may be any bottle with a mouth large enough to take two pieces of glass tubing—even pickle bottles, jam jars, or potted-meat bottles have served. A piece of cork is cut roughly to fit the inside of the neck, and two holes are bored in it with a hot skewer or nail to take the glass tubes.

" The outside of the container may be graduated in five (5) or ten (10) c.c.'s by adding these amounts from a measure and scratching on the glass.

" Four pieces of glass tubing are then cut, the first about 4 in. long, which is flanged at one end and has a small bulb (A) blown in it. The bulb is stuffed with cotton wool.

" The lengths of the next two pieces (E and D) depend upon the size and shape of the container; they are each flanged at the short end, bent at right angles, and inserted through the cork as shown in the figure. The fourth piece (G) is straight, and about 2 in. long; both ends are flanged.

" When cool, the ends B and C and of E and G are connected with rubber tubing of convenient lengths, that connecting F and G being much the longer.

" The lower end of G is connected with a serum needle—preferably of platinum-iridium—by a very short piece of rubber tubing, so that the needle almost touches the glass. The joints may be reinforced with ligatures. The needle attached to the tubing is then placed, with stylets and a spare needle, in a test-tube, which is plugged with cotton wool. If necessary, the plug can be sealed with paraffin or other wax after sterilization.

" If the apparatus is to be used for blood-culture work, the required amount of medium—broth, bile, or taurocholate solution—is introduced into the container, the apparatus fitted together as shown, and the mouth of the bottle above the cork filled with Chatterton's composition. This is a composition containing some kind of pitch, and can be obtained from any motor transport depot ; it is used for water-proofing batteries.

" At a pinch, a piece of stout paper may replace the cork, as all that is required is a scaffold to retain the composition in place, and prevent it from running into the container during sterilization. The whole apparatus is then autoclaved ; if it be wanted for the collection or injection of serum, it is, of course, autoclaved empty.

" When it has cooled and the pitch is beginning to set, the long bent tube is adjusted to the desired height. The rubber tubes are folded on themselves and ligatured with tape, tied in a bow, and in about 24 hours the composition sets to a firm mass. The apparatus can now be stored for an indefinite period without the contents evaporating or being contaminated ; or transported any distance in any position, or shaken, without the contents spilling.

" To take a blood-culture, the tubes are untied, the needle removed from the test-tube and introduced into a vein ; the bottle is held below the level of the vein and the necessary amount of blood is run in—aided by suction at A if necessary. When this has occurred, the long rubber tube is pinched with the fingers or a spring clip (previously adjusted), the needle is removed from the vein, flamed and sealed by running in a little paraffin wax which has been sterilized by heat. (A convenient form of container for this can be improvised from a small test-tube and a piece of wire, as shown (H), and sent out with the apparatus.)

" The rubber tubes are then re-tied, the apparatus sent to the laboratory and incubated ; if anaerobic cultures are desired, a glucose medium may be used, with a layer of liquid paraffin on top, or, if preferred, A can be attached to a vacuum pump and hydrogen passed through the medium from G.

" For examination, the needle is unsealed by flaming, and the necessary amount of medium blown out on to plates (or into any special medium), the process being repeated as often as desired without exposing the blood-culture medium to any possibility of contamination.

" Further, the long bent tube can be raised or lowered so as to examine fluid from any particular layer, as the composition is easily softened by warming it.

" For use in a place where ordinary laboratory apparatus are obtainable, the container may be a flask or long, narrow, graduated cylinder, fitted with a perforated rubber cork. The principle remains the same." . . . .

A. G. B.

WATKINS-PITCHFORD (W.). **The " Mosquito " Apparatus for obtaining a Blood-Sample by Vein-Puncture.**—*Med. Jl. S. Africa.* 1921. Feb. Vol. 16. No. 7. pp. 133–136. With 4 text figs.

Herein is described and figured an apparatus which facilitates the taking of samples of blood, invented by Mr. W. W. LOUTTIT, a Technical Assistant at the South African Institute for Medical Research.

A. G. B.

McKendrick (A. G.). **The Bleeding of Healthy Rabbits.** — *Indian Jl. Med. Res.* (Special Indian Science Congress Number, 1920). pp. 58–59.

When large quantities of rabbits' blood are constantly required (*e.g.*, for making media) the author recommends keeping up a batch of twenty rabbits and taking the blood straight from the heart. The following is the technique to be followed :—

" (1) Place the rabbit on its back on the operating table and proceed to the taking of blood without any delay. (2) Have the lower limbs held extended by an attendant and the upper limbs held extended alongside the ears by another. (3) Moisten the fur over an area situated about the middle of the lateral aspect of the chest on the left side. (4) Grip the chest with the left hand, the thumb being over the moistened area and the fingers on the opposite side of the chest. (5) Feel for the heart-beat with the thumb. (6) Press deeply so as to obtain the feeling of the heart's palpitating surface. (7) Shift the thumb to the side of this area. (8) Use a perfectly sharp needle and a smoothly working 20 cc. syringe, containing 3 cc. 1·5 per cent. citrated 0·85 per cent. salt solution. (9) Enter the chest through an interspace in the middle of the determined area with the syringe held horizontally and the hand supported by the table. (10) Penetrate the chest wall very carefully and without forcing to a distance of 1 to 2 cm., keeping up a slight negative pressure in the syringe, as soon as the chest is entered. (11) Watch for the entry of blood into the syringe. (12) Take a grip of the barrel of the syringe with the left hand, and aspirate blood by slow withdrawal of the piston with the right.

" *Notes.*—The heart beats violently for a time after the animal is placed on the table, and it should not be allowed to quieten down before the withdrawal of blood. It is very necessary to feel the heart's beating surface if the operation is to be certainly successful. Unless the needle is sharp, it may push the heart in front of its point. The syringe should be tested for easy movement of the piston, and the absence of leakage at the junction of needle and body, or elsewhere. This is on the assumption that the blood is to be used for the preparation of media. The presence of citrate, which prevents clotting, makes the operation very much easier. The whole of the manipulation of the syringe up to this point is performed with one hand.

" In the case of the 20 cc. syringe manufactured by Collin, negative pressure is exerted as follows :—The little finger of the right hand is passed through the ring at the outer end of the piston rod, and the ball of the thumb rests on the top of the syringe.

" With the body of the syringe in the palm of the hand and this disposition of the fingers, it is easy to exert the slight negative pressure required, by pull of the little finger. The entry of blood into the syringe is often slow, and no attempt should be made to accelerate its entry by forced aspiration. If the stream of blood fails, move the point of the syringe a little backwards or forwards. As a rule, this is quite sufficient to free the eye of the needle. Only one puncture should be made at one time, and the rabbit will then serve over and over again, if well cared for, for removal of blood."

In the course of 11 months the author took over 16 litres of blood from 68 rabbits by this method, the mean number of punctures per rabbit being 17·25, and the mean number of cc. of blood per puncture being 15·9 ; and at the time of writing 31 of the animals were alive and well.

A. Alcock.

Roth (George B.). **Intravenous Administration to Mice, Rats, and Guinea Pigs.**—*Public Health Rep.* 1921. Apr. 1. Vol. 36. No. 13. pp. 661–665. With 6 text figs.

A detailed description, with illustrative figures and plates, of the technique of intravenous administration of arsenicals and the like to small animals. Laboratory workers will be well advised to consult it.

A. G. B.

Nand Lal. **The Re-use of Media.** *Indian Jl. Med. Res.* 1921. Apr. Vol. 8. No. 4. pp. 731–732.

The utilizing of used media may be necessary in war time when the conservation of all nutritive matter is obligatory.

The author found that three successive (though diminishing) crops of *V. cholerae* could be grown on the same medium, that the said medium was then barren to the Shiga bacillus, but was fertile for three successive (diminishing) crops of *B. typhosus*.

He also found that three successive (diminishing) crops of Shiga bacillus could be grown on the same medium, and that the said medium was then fertile in diminishing degree respectively for three successive crops of *V. cholerae*, and after that for two crops of *Staphylococcus pyogenes aureus*. It is to be noted that the third crop of *V. cholerae* on this much-used medium was very poor, and that the first sowing of *S. pyogenes aureus* was a failure.

The method of experiment in every case was to remove the whole of a 24-hour growth on tryptic-digest casein-agar, measure it, re-sterilize the medium, and to continue sowing and re-sterilizing until no growth occurred.

A. A.

Norris (Dorothy). **The Preparation of a Simplified Culture Medium for Field Workers.**—*Indian Jl. Med. Res.* 1920. Apr. Vol. 7. No. 4. pp. 704–709.

Summary and conclusions :—

" 1. The preparation of a dry nutritive powder from caseinogen is described.

" 2. This powder does not require the addition either of peptone or extractives, but may be made up into solid nutritive medium merely by the addition of agar and normal saline or tap water.

" 3. It is obvious, therefore, that it would be extremely useful for field workers, both on account of its portability and the extreme ease with which it can be made into culture medium.

" 4. It is suggested that the name ' trypsinoids ' be given to the powder.

" 5. Similar experiments with ordinary brewer's yeast, fresh and dried, are described, but it would appear, under the conditions tried, that caseinogen yields the more nutritive powder of the two."

A. G. B.

Harvey (W. F.) & Iyengar (K. R. K.). **Desiccated Nutrient Media.**—*Indian Jl. Med. Res.* 1921. Oct. Vol. 9. No. 2. pp. 364–368.

The authors refer to a paper by E. T. Thompson (*Lancet*, 1910, May 21, p. 1411) on the desiccation of culture media and its practical advantages. They here describe their own method of preparing a

nutrient agar powder, from which a nutrient fluid medium can be made simply by extracting with water in the cold and rejecting the undissolved agar. By experiment they find no evidence, as judged by yield of growth, that there is any loss of nutrient quality in media so prepared.

A. A.

Norris (Dorothy). **The Preparation of a Culture Medium suitable for the Growth of Organisms used as Vaccines.** - *Indian Jl. Med. Res.* 1920. Jan. Vol. 7. No. 3. pp. 536–544.

The preparation of a culture medium from caseinogen is described, and the results obtained compared with those given by a meat medium. The preparation is not so laborious, and the time occupied in production is much less in the case of caseinogen than in the case of meat. The growths of bacteria obtained are equally good and the cost is much lower.

A. G. B.

Harvey (W. F.), Iyengar (K. R. K.) & Christophers (S. R.). **The Influence of Age and Temperature on Bacterial Vaccines.** *Indian Jl. Med. Res.* 1921. Apr. Vol. 8. No. 4. pp. 715–727.

The effects of age and temperature on typhoid and cholera vaccines are here experimentally considered and tabulated, the conclusion being that these vaccines do not deteriorate in antigenetic potency, as judged by agglutination response, within twelve months, or at any temperature to which they are likely to be exposed. On the evidence here collated it would appear that there is no necessity to adopt any elaborate precautions for preservation of vaccines, or to keep antigen suspensions, such as are used in agglutination tests, at cold storage temperature.

The experience of other observers is referred to, particularly that of Stevenson, who found (1) that the immunizing as well as the toxic power of broth cultures of *B. pestis* increased up to about the second month of incubation, after which it became stationary, and then gradually decreased; (2) that autolysis diminished the immunizing power parallel with the toxicity somewhere between the second and the third month of incubation; and (3) that length of storage does not diminish the immunizing value of the vaccines at nearly the same rate as it does the toxicity: vaccines over two years old were proved to possess some protective value, and vaccines of fourteen months had strong protective power.

A. A.

Malone (R. H.) & Goré (S. N.). **The Detection of Indole in Bacterial Cultures. A Criticism of Various Methods of applying the Nitroso-Indole and Rosindole Reactions, based on a Comparative Study of their Delicacy and Specificity.** - *Indian Jl. Med. Res.* 1921. Jan. Vol. 8. No. 3. pp. 490–504.

Conclusions.

" 1. Neither the nitroso-indole nor the rosindole reaction provides a specific test for indole, but the latter, in virtue of its great delicacy, is the reaction of choice for detecting indole in bacterial cultures.

" 2. The inconsistent results obtained by workers employing these reactions may be attributed to :—

(*a*) The absence of tryptophane or a tryptophane polypeptide group from the culture media employed.

(*b*) The presence of degradation products of tryptophane, other than indole.

(*c*) Defective methods of applying the tests.

" 3. Some of the methods (Nos. I. and II.) recommended in text-books on bacteriology as a routine test for indole are so crude as to be entirely unsuited for this purpose.

" Others, while possessing great delicacy, are likely to yield fallacious results because they do not provide a means of distinguishing indole from other degradation products of tryptophane (notably indolacetic acid).

" 4. The method which combines delicacy and specificity, and best fulfils the conditions laid down for a routine test is that described under the heading ' Goré's cotton wool plug test.' Under the conditions of these experiments and in actual practice it has been found to be a simple, delicate, and reliable method."

A. A.

GORÉ (S. N.). **The Cotton Wool Plug Test for Indole. A New Technique of applying Ehrlich's Reaction for detecting Indole in Bacterial Cultures.**— *Indian Jl. Med. Res.* 1921. Jan. Vol. 8. No. 3. pp. 505–507.

" Stated briefly, this test consists in moistening the under-surface of the cotton wool plug of the culture tube with a few drops of Böhme's solutions and heating the tube for a few minutes. In the case of a positive result a rose colour appears on the under-surface of the plug.

Materials required for the Test.

" Böhme's Solution No. 1—

Para-dimethyl-amido-benzaldehyde	1 gm.
Absolute alcohol	95 cc.
Hydrochloric acid	20 ,,

" Böhme's Solution No. 2—

Potassium persulphate	1 gm.
Distilled water	100 cc.

" *Note.*—These two solutions may be conveniently stocked in glass-stoppered drop bottles.

" Some arrangement for keeping water gently boiling.

Details of the Test.

" 1. Remove the plug of the culture tube and, if it does not already consist of white absorbent cotton wool, cover its under-surface either with a thin layer of such cotton or with a piece of filter paper.

" *Note.*—A white absorbent surface is essential, as Ehrlich's colour reaction is to be effected and observed thereon.

" 2. Moisten evenly the under-surface of the plug first with a few (4–6) drops of the persulphate solution, and then with a few drops of the para-dimethyl-amido-benzaldehyde solution.

" *Note.*—The persulphate is necessary, as it helps to oxidize the indole compound from a lavender to a rose colour ; the latter colour is more intense than the former, and the persulphate thus adds to the delicacy of the reaction.

" 3. Replace the treated plug, and push it down the tube until it is an inch or an inch and a half above the surface of the broth culture.

" *Note.*—This is essential, in order that when the broth is heated most of the indole-laden vapour from the broth may be absorbed by the under-surface of the plug, instead of condensing on the walls of the test tube.

" 4. Place the prepared culture tube upright in the gently boiling water-bath.

" *Note.*—This precaution is necessary to prevent the broth from coming in contact with the plug and thus vitiating the specificity of the test.

" 5. Allow the tube to be heated for about fifteen minutes.

" *Note.*—During this period sufficient indole volatilises to give a positive reaction even when the quantity of indole is as little as 0·0005 milligrammes per cubic centimeter of the broth culture.

" 6. Now remove the test tube from the water-bath, and examine the under-surface of the plug *in situ* in a good light.

" *Result.*—If indole be present in the culture, the under-surface of the plug becomes rose-coloured owing to the volatilised indole reacting with the Böhme's solutions.

" In the case of a negative result, the cotton wool plug remains unaffected.

" *N.B.*—The test may be performed with agar as well as with broth cultures.

" From the above description of the cotton wool plug test for indole, it will be seen :—

" (i) That *specificity* is attained by subjecting only the volatile products to the colour reaction, indole being the only volatile chromogenic product in aerobic bacterial cultures.

" (ii) That *delicacy* is attained, first, by using Ehrlich's aldehyde—the most sensitive reagent for indole—and, secondly, by performing and observing the colour reaction on a white absorbent surface.

" (iii) That *simplicity* is attained by moistening the under-surface of the cotton wool plug of the culture tube with a few drops of Böhme's solutions and heating the tube for a few minutes. The presence of indole is denoted by a rose colour on the under-surface of the plug."

A. A.

Nand Lal. **The Viability of Bacterial Cultures.**—*Indian Jl. Med. Res.* 1921. Apr. Vol. 8. No. 4. pp. 728–730.

The conclusions recorded in this paper are (1) that sealing of cultures is an important factor in their preservation, and (2) that haemophil organisms, such as meningococcus, gonococcus, and *Bacillus influenzae*, can be preserved for at least 50–60 days without subculture, if kept continuously at incubation temperature.

A. A.

Harvey (W. F.). **Bacteriological and Laboratory Technique.**—*Indian Jl. Med. Res.* 1920. Oct. Vol. 8. No. 2. pp. 270–303.

This is the first instalment of a laboratory worker's *vade mecum* arranged somewhat after the method of certain catalogues of scientific literature. The work is to be continued in serial form and will take several years to complete. It is intended for those who are familiar with the technique of a bacteriological and pathological laboratory, not for beginners.

A. A.

Harvey (W. F.). **Production of High Titre Sera.**—*Indian Jl. Med. Res.* 1920. Apr. Vol. 7. No. 4. pp. 682–700.

The conclusions of this paper are as follows :—

" 1. A convenient series of doses for the intravenous inoculation of goats with living organisms is that number of organisms corresponding to 1, 2, 3, 4 mgms. of dried bacterial substance. Fowls can stand large doses intravenously.

" 2. No harm results from frequent repetition of intravenous inoculations in goats or fowls.

" 3. A seven or ten-day interval is a convenient one to allow between inoculations, and may be adopted in goats and fowls without reference to restoration of body weight.

" 4. Intravenous inoculation of antigen—as is now well known—is more efficient for the production of antisera than intraperitoneal. Subcutaneous inoculations are not satisfactory, except from the point of view of lessened fatality.

" 5. Very large doses of living organisms, such as the staphylococcus or cholera, can be given intravenously to goats. Organisms of the dysentery group have to be more carefully administered than others.

" 6. Suspensions of living organisms obtained from laboratory strains may be given *ab initio* intravenously in goats.

" 7. Good antisera are obtainable by confining oneself to intravenous inoculation of suspensions of killed organisms.

" 8. Organisms simply desiccated form a very satisfactory, very stable, and very efficient antigen.

" 9. Rabbits yield a serum of higher titre and higher specificity than goats. Goats are exceedingly convenient animals for the production of high titre sera, and yield far larger amounts of serum than rabbits. Goat serum can be procured in such large quantities that it may be issued undiluted. Fowls have certain advantages over both goats and rabbits.

" 10. The titre of an agglutinating serum, once raised, can be very easily maintained in goats by subcutaneous inoculation."

A. G. B.

Mackey (G.). **Preservation of High Titre Agglutinating Serum and Corresponding Antigen.**—*Indian Jl. Med. Res.* 1921. Apr. Vol. 8. No. 4. pp. 733–736.

Experimental data from antigen suspensions and from antisera to *B. paratyphosus* B and to *M. melitensis* are here tabulated in support of the following conclusions :—

" 1. Antigen suspensions used for agglutination purposes preserve their agglutinability for a considerable time at ordinary room temperatures.

" 2. Agglutinating antisera lose their potency only at a slow rate when kept at room temperature. A *M. melitensis* serum loses its potency more rapidly than a *B. paratyphosus* B serum.

" 3. Agglutinating antisera may lose their potency comparatively slowly when kept at 37° C., as in the case of a *B. typhosus* B serum, or rapidly even to complete loss, as in the case of a *M. melitensis* serum.

A. A.

Wordley (E.). **A New Method for the Isolation of Organisms from Faeces and Sputum, with Some Observations on Haemolytic Streptococci in Faeces obtained by this Method.**—*Jl. of Hyg.* 1921. July. Vol. 20. No. 1. pp. 60–68.

The method here described was devised by Professor L. S. Dudgeon in the Balkans during the war.

" A portion of the faeces, about a small teaspoonful, is evenly spread over a porous tile resting on an asbestos mat, and allowed to dry for from

thirty minutes to two hours, at room temperature, according to the amount of water or mucus in the specimen. When the faeces are dried to a stiff paste this is scraped off and evenly spread on a second tile, and allowed to dry for a further one to two hours, or until it has become a fine dry powder when scraped off. A quantity of this dry powder is transferred to a plate, and evenly spread over the surface with a glass spreader. If the faeces are liquid, as much as possible should be poured on the first tile short of letting it run over the edge. By using two tiles one after the other, it will be found that however liquid the faeces are, or however much mucus is present, complete drying can be obtained. It is important, in order to get the best results, that the material should be completely dried on the second tile before plating, and when scraped off be in the form of a sand-like powder, with no trace of stickiness.

" By this method excellent separation of individual colonies is obtained over the whole surface of the plate, with no tendency to run together, so that suspicious colonies can be picked off with ease. It is quick, and since it is equally applicable to any infection, is most economical with media, since different methods do not have to be adopted according to the nature of the organism suspected of being present. Using other methods than the tile method on an erroneous supposition of the infecting organism, the latter may be easily missed, as will be shown later.

" By this method of drying on tiles it is extremely easy to isolate small portions of mucus, which would be missed if the solid stool were examined, and thus is a most suitable procedure in enabling one to examine likely portions for *Entamoeba histolytica* cysts. Naturally in this instance complete drying is not resorted to, but just sufficient to produce a stiff paste, in which pieces of mucus are easily seen. The same procedure can be followed also in searching for the ova of parasitic worms."

In plating from sputum the same procedure is adopted. The tile should be covered with a bell jar. The dried sputum is a light, flaky, very fine powder, and it is advisable when scraping it off the tile to work behind a screen.

" The tiles used are white unglazed porcelain tiles, about 6 in. square. For use each large tile is divided into four pieces, which gives a more convenient size to spread the material on. When required for use they are sterilized by heat, an electric hot plate is very convenient, but this can be done equally well by placing them on an asbestos cooking mat supported on an iron tripod and heating them with a Bunsen burner. Such asbestos cooking mats can be obtained from any ironmonger or stores. When cooled the tiles are ready for immediate use. For spreading the faeces and for scraping off the dried residue an old knife, especially kept for the purpose, is very convenient, since it can be easily sterilized by heating to redness."

The method was used in a series of examinations of stools of patients known to be suffering from an infection of the Enterica group, in a case of Flexner dysentery, and in experiments in which a pure culture of B. Flexner was added to faeces.

Total number of examinations	91
Negative results by both dry method and alternative method used	53
Total positive results by dry method	33
Total positive results by alternative method, *i.e.*, either peptone water brilliant green for the enteric group, or from broth for dysentery infections with negative results from dry method	5

" Of these 33 positive results by the dry method, positive results were also obtained in 14 instances by one of the alternative methods, according to the nature of the infection. . . . . ."

A. G. B.

i. Malone (R. H.). **The Production of *B. influenzae* Vaccine on a Large Scale.**—*Indian Jl. Med. Res.* 1921. July. Vol. 9. No. 1. pp. 56–62. With 1 text fig.

ii. — —. **A Note on the Large Scale Production of Pneumococcus Vaccine.**—*Ibid.* pp. 63–65.

i. *B. influenzae* can be manufactured on a large scale by growing the organism in Douglas mutton-broth (pH 7·2–7·4), containing 0·5 per cent. glucose and 0·5 per cent. pigeon blood. And by the process described in full detail in this paper the final product is a suspension of organisms in normal salt solution practically free from protein derived from the broth.

The author thinks that this method should also be applicable to vaccine production for organisms other than *B. influenzae*.

ii. This short note deals with the method described above as applied to the large production of pneumococcus vaccine. The steps of the method are described in detail.

A. A.

Harvey (W. F.). **Note on Dilution of Reagents.**—*Indian Jl. Med. Res.* 1920. July. Vol. 8. No. 1. pp. 131–135.

" Dilution of concentrated suspensions or solutions is a very common procedure in bacteriology. When the dilution is of a simple character there is little difficulty in the calculation necessary to determine what is to be done. But there are cases in which the dilution required is not of a simple kind. An example will make the point clear. It is required, say, to make from a suspension of concentration (or dilution) 3 in 10 another of concentration 2 in 11 by adding to it an appropriate quantity of diluent. We may work out the answer by expressing the concentrations as fractions, viz., 3–10 and 2–11. Bring both to the same common numerator, which makes then 6–20 and 6–33, respectively. Thus the undiluted suspension consists of 6 parts (or units or volumes) in 20, and the concentration to be obtained from it is 6 in 33. If we take 20 parts of the former, it will contain 6 parts of the suspended material. Add now to these 20 parts of suspension 13 parts of diluent, and so make the total number of parts up to 33. This total volume of 33 parts will still contain only 6 parts of suspended matter, and will be the dilution required. The procedure here very simply illustrated is one of bringing fractions to a common numerator, and may be set out as a *rule* thus :—

" *Rule.*—Multiply up crosswise numerators and denominators of the fractions representing strength of fluid to be diluted and strength of the dilution to which it is to be brought. Subtract the lesser figure thus obtained from the greater. Then take, in volumes or parts or units of the fluid to be diluted, the lesser figure, and add as diluent in volumes or parts or units the number obtained by subtraction.

" It is obvious that it will often be possible to reduce the figure obtained to simpler proportions. If it is required to add 15 parts of diluent to 5 parts of a given fluid, this is the same as adding 3 to 1."

The author gives numerous examples of the working of the rule.

A. A.

Harvey (W. F.). **Estimation of Erythrocyte and Haemoglobin Content of Blood.**—*Indian Jl. Med. Res.* 1920. Jan. Vol. 7. No. 3. pp. 479–491.

This article deals with : (1) Estimation of volume of erythrocytes ; (2) estimation of blood content by tint and turbidity ; (3) estimation of haemoglobin.

1. The method described replaces the Thoma-Zeiss counting chamber, which, when a number of cases have to be examined, is time-consuming and causes eye-strain. Objections against the use of volume as a measure have been that the volume varies greatly according to the type of anaemia—this the author doubts—and that no account is taken of the disturbing element of leucocyte content, which he deems unimportant. The author uses simple capillary tubes, the method being a variation of one described by Almroth Wright. Full details are given. Criticisms are met and results obtained compared with those of the Thoma-Zeiss method.

2. The author has succeeded in obtaining a fluid which preserves the blood indefinitely from haemolysis, but not one which preserves the tint. He uses formalin, 10 per cent. in 0·85 per cent. sterile salt solution.

A. G. B.

Harvey (W. F.). **On the Use of Birds as Laboratory Animals.**—*Indian Jl. Med. Res.* 1920. Jan. Vol. 7. No. 3. pp. 492–494.

In a country like India rabbits and guinea-pigs are neither easily procurable nor cheap. The author made trial, therefore, of the common fowl, which was found quite suitable for the production of high titre agglutinating sera, but not for that of haemolytic sera for the Wassermann test. Guinea-fowl and pigeons were also tried, the latter bird, for its size, being the most satisfactory of the three; it has a comparatively large wing vein for inoculation and withdrawal of blood.

"*Technique of Production of Sera.*—(1) Use in all the birds the series of doses of living bacteria equivalent to weights of 1, 2, 3 and 4 mgm. of dried bacterial substance, or possibly a slightly lesser dosage, seeing that this series gives rise to loss of weight. (2) Administer these doses intravenously at intervals of one week. (3) Test the potency of the serum ten days after the last injection. (4) Use a large-bore 20 cc. syringe needle for bleeding, if the serum is up to titre. (5) Pass the needle into the wing vein, which should be denuded of feathers, and collect the blood, which issues in drops, in a test tube. (6) Place the test tube immediately in the sloped position in the incubator at 37° C. for two hours. (7) Remove the test tube and set vertical. (8) Leave overnight and pipette off the serum which has collected in the morning. (9) Test the potency of the serum. (10) Dilute with 0·85 per cent. sterile salt solution, containing 0·5 per cent. carbolic acid, to give an agglutinating titre of 1 in 1,000 for the specific organism. (11) Issue for use."

In two examples given in which *B. typhosus* was used a titre of 1 in 8,000 was reached in fowl and pigeon respectively.

A. G. B.

Mouchet (R.), van Nitsen (R.) & Walravens (P.). **La séro-réaction de Bruck en Afrique tropicale.**—*C. R. Soc. Biol.* 1921. Oct. 22. Vol. 85. No. 29. pp. 720–722.

For the isolated practitioner in the colonies the paraphernalia of the Wassermann test are an impossibility. In seeking for a simple substitute for that test the authors have investigated the Bruck test, and they find that while in syphilis and yaws the Bruck test is as certainly positive as the Wassermann, it also is generally positive in malaria. As in the tropics many Europeans and most natives are chronic malarians, the Bruck reaction is no substitute for the Wassermann in tropical colonies. Another observation here recorded is that while in

the course of treatment with arsenobenzol for syphilis and yaws the African native ultimately gives a negative Wassermann, the Bruck reaction is persistently positive.

A. A.

Heinemann (H.). **Vergleichende Blutuntersuchungen mit den Methoden von Wassermann, Sachs-Georgi und Meinicke (DM). I. Mitteilung.** [Comparative Blood Examination by the Methods of Wassermann, Sachs-Georgi and Meinicke (DM). Part 1.]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1921. Vol. 25. No. 3. pp. 80–90.

This is a report in much detail of a comparative examination of 1,000 sera with a view to determining whether in small tropical hospitals where there is no means of carrying out the Wassermann test any other test might be substituted for it. The paper cannot be summarized briefly, and it is hardly worth citation at full length, since the author himself admits that the tests here compared with it (Sachs-Georgi and Meinecke) are about as difficult to provide for as the Wassermann test itself.

A. A.

Stévenel (L.). **Le bleu au permanganate.**—*Ann. de Méd. et de Pharm. Colon.* Paris. 1921. Apr.–May–June. Vol. 19. No. 2. pp. 207–209.

Permanganate blue, which is a convenient stain for blood-films, is prepared as follows :—

In two separate vessels dissolve (*a*) 1 gm. of ordinary methylene blue in 75 gm. H_2O, and (*b*) 1·50 gm. $KMnO_4$ in 75 gm. H_2O.

Mix the two solutions in a flask. A copious precipitate is formed, with disengagement of heat, and the supernatant fluid becomes almost colourless. Presently the precipitate becomes in great part redissolved as a violet-blue solution. Leave the flask in a hot-water bath for half an hour for the reaction to be completed, and then filter. The liquid after filtration is permanganate blue.

For differential staining of blood-films and smears flood the fixed film in a 1 in 2,000 solution of eosine for three minutes, and then, after washing, flood in a 1 in 10 dilution of the above permanganate blue for twenty minutes for haematozoa, and for an hour for treponemata, and then wash and quickly dry.

A. A.

Grant (Garnet B.) & Wilson (Eric R.). **Two Stains used in Preference to Wright's Stain in the Routine Staining of Blood Smears.**—*Jl. Lab. & Clin. Med.* 1921. July. Vol. 6. No. 10. p. 593.

For differential counts, but not for malaria parasites, double staining with a saturated solution of eosin in methyl alcohol and Mallory's instantaneous haematoxylin is here recommended. For malaria parasites they prefer 0·25 per cent. watery solution of Azur II. as the second stain.

A. A.

Kop (W. A.). **De normale verhoudingen der bloedcellen in de tropen.** [The Normal Proportions of the Blood-Cells in the Tropics.] —Leiden: 1920. pp. 1–38.

This small octavo publication is a Dutch thesis presented to the University of Leyden, in December 1920, for the degree of Doctor of Medicine. Although the conclusions reached by the author are not

strikingly novel, the thesis bears evidence of careful and critical work; and as it is, moreover, written shortly and to the point, it merits the attention of other workers in the tropics.

The author begins by noting that a knowledge of the cellular constitution of the blood in normal residents in the tropics is indispensable, since it is obviously impossible to interpret blood-counts made for diagnostic purposes in diseased conditions unless we know what to expect in health. He observes that, in spite of all the work already done, there is still no unanimity regarding the "normal" blood-picture, and more especially regarding the Arneth index, in dwellers in the tropics. The present work was undertaken to settle these points.

The author made his observations at Weltevreden, Java, where he investigated altogether 93 normal healthy individuals—55 Europeans and 38 natives. He describes his technique in some detail, and justifies the various methods which he adopted in his researches. It may be noted that the blood-counts were made on films taken, with suitable precautions, before nine o'clock in the morning from subjects with empty stomachs.

The results of the investigation are recorded in a series of tables, and may be summarized as follows :—

1. The total numbers of red and white corpuscles are the same in tropical dwellers as in persons living in temperate climates. The haemoglobin content is also normal, and the haemoglobin index = 1.

2. In the persons studied the percentages of the various kinds of leucocytes were found to be :—

	Average.	*Variation.*
Mast-cells	0·5 ..	0–3
Eosinophils	3·5 ..	1–8
Large mononuclears + transitional cells	6·0 ..	2·5–11
Lymphocytes	50·0 ..	26·5–70
Neutrophils	40·0 ..	19·5–63·5

3. The Arneth index is normal, both in natives and in Europeans (*i.e.*, there is no shift to the left).

4. The only difference observed between the blood-count of Europeans and that of natives was in respect of the eosinophils, which were found to be more numerous in natives. This eosinophilia of native subjects is satisfactorily explained by their higher rate of infection with intestinal worms.

The general conclusion reached is, therefore, that the cellular constitution of the blood of normal persons living in the tropics is essentially identical with that observed in healthy persons dwelling in temperate climates.

Clifford Dobell.

Bais (W. J.). **Vergiftiging met zaden van** *Artocarpus polyphema.* [Intoxication by the Seeds of *A. polyphema.*]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1921. Vol. 61. No. 4. pp. 352–356.

Artocarpus polyphema (Malay : Tjempedak) is a well-known fruit in the Dutch East Indies. Besides the fleshy part the seeds are eaten, generally roasted. In the literature nothing is reported about toxicity of the seeds, though the native population seems to be aware of some danger.

The author saw intoxication in 16 Javanese after use of the seeds (4–400), the symptoms being nausea and vomiting, giddiness, a low temperature, and a slow pulse ; in the more serious cases coma

resulted, lasting from 2–5 days, with large pupils reacting very slowly to light.

The nature of the toxic substances remained unknown.

W. J. Bais.

KOSTER (S.). **Een vergelijkend reukonderzoek bij Inlanders van Ned.-Oost Indië en Hollanders.** [A Comparative Investigation of the Power of Smelling in Natives of the Dutch East Indies and in Dutchmen.]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1921. Vol. 61. No. 2. pp. 165–189. With 2 charts.

The author made a series of detailed experiments to compare the power of smell of natives of the Dutch East Indian Archipelago with that of Europeans. The test substances he used were acetic acid and ammonia in different dilutions. He comes to the conclusion that natives do recognize these smells (and probably others as well) in far higher dilutions than Europeans do. He discusses the possible reasons of this difference, and thinks that the lower stage of cultivation is responsible for it. HENNING is of the opinion that in uncultivated races the power of smell is developed by the higher degree of practice of the smelling organ, whilst, on the other hand, the frequency of diseases of the nose in European races is liable to interfere with their sense of smell in general.

W. J. Bais.

DE RAADT (O. L. E.). **Uittreksel uit het jaarverslag over 1920 van den Geneeskundigen Dienst der Ombilin-mijnen.** [Extract from the Year Report of 1920 on the Medical Service of the Ombilin Mines.] —*Geneesk. Tijdschr. v. Nederl.-Indië.* 1921. Vol. 61. No. 2. pp. 138–156.

This extract concerns anaemia, enteric and beriberi. The features of general interest are the following :—

For the detection of hookworm eggs, if these are scarce, the author recommends mixing part of the faeces well with a saturated solution (33 per cent.) of common salt. The eggs are lighter than the salt solution, and accordingly appear drifting on the surface, whence they can be drawn with a little spoon. [The workers of the Rockefeller Institute use for the same purpose equal parts of saturated salt solution and glycerine.]

Anaemia amongst the miners is considered to be due to either worm disease, malaria, or syphilis (or framboesia) ; this last diagnosis is often made " per exclusionem," and is then generally confirmed by the serum test. As such the Sach and Georgi method was found by the author to be a trustworthy one.

The diagnosis of typhoid was made by blood-culture. The author takes 2 cc. of blood and adds it to 5 cc. of sterile ox-bile. After about two days' incubation at 37° C. a platinum loop of the blood bile is inoculated in broth and left at 37° for another day. If any growth appears in this tube its contents are inoculated into two other tubes of broth, one of which is mixed with agglutinating typhoid serum in a dilution of twice its limit of agglutination power ; the other tube serves as a control. If the culture contains typhoid bacilli in the serum tube agglutination will occur during the growth and be apparent after 5–6 hours. Later it becomes too cloudy to give clear results.

[Practically the same method has been described by LÖWENFELD, *Münch. Med. Woch.* 1915. Vol. 62. pp. 433.]

W. J. Bais.

BOOK REVIEWS.

KIRKPATRICK (Henry). **Cataract and its Treatment.**—xiv + 201 pp. With 70 illustrations in text. 1921. London: Oxford Medical Publications: Henry Frowde & Hodder & Stoughton. [Price 12*s.* 6*d.*]

Although Colonel Kirkpatrick is well known as a fluent and able writer in various ophthalmic and other medical periodicals, this book constitutes his first effort as an author, and in congratulating him on its appearance we would express the hope that it will be very far from the last of the serious works of his pen. As Superintendent for many years of the Government Ophthalmic Hospital, Madras, he had opportunities that are granted to very few men in a generation; for not only is the surgical material immense, but the organization for the examination of the cases before operation and for their subsequent after-treatment and observation has been brought to a very high pitch indeed. Amongst the many subjects which have interested him, that of cataract has naturally been one of the most prominent owing to the fact that about 1,200 extractions are performed annually by the Superintendent of the Institution. As might have been expected, almost every page of the book impresses the reader as having been written by an expert of no mean order, who has not merely learnt his facts at first hand, but has brought to bear on their compilation and on their analysis a critical judgment and a wide sympathetic understanding of what others have done and written in the same field.

The chapters deal in turn with (1) the development, anatomy, and nutrition of the lens; (2) the vexed question of the aetiology of cataract; (3) the clinical varieties of senile cataract; (4) the non-operative treatment of cataract; (5) the surgical treatment of cataract (spread over seven chapters); (6) the treatment of special forms of cataract (three chapters); and (7) a discussion of the results obtained by operation.

Every chapter closes with a list of the references, placed in alphabetical order. There is a good index of names, and another of subjects. When it is said that the book is published by the Oxford Medical Publications, that alone is sufficient guarantee for all that concerns the printer. Kirkpatrick's style is pleasant and easy to read. His book will be a boon to many of those who are interested in cataract. It will certainly be a standard work, which will enhance his reputation, and which will find a very large circle of readers.

R. H. Elliot.

AMSTERDAM. **Vereeniging "Koloniaal Institut" Negende Jaarverslag 1919.**—Ditto. **Tiende Jaarverslag, 1920.**—137 pp. and 112 pp. Druk de Bussy

The Colonial Institute of Amsterdam is surely to be congratulated in including among its many interests a section of tropical hygiene—a section adorned by numerous distinguished names and justified by its long list of published investigations. Among the recent publications catalogued in these two volumes are papers on trypanosomiasis, malaria, dysentery, intestinal protozoa, and plague; a long list of important papers on Anophelines and their biology and pathogenic bearings by SWELLENGREBEL and his colleagues; and numerous papers relating to bacteriology.

A. Alcock.

BENCHETRIT (A.). **Nuevas Disertaciones.**—112 pp. 1921. Caracas: Tipografia Guttenberg.

These dissertations touch many strange points in their comprehensive sweep. They include, besides biography and bibliography and excursions into mathematics, such varied subjects as dietetic treatment of vesical

calculus, disadvantages of a milk diet in fevers, relation between molecular structure and physiological effects of drugs, cure of leprosy, coefficient of detoxication, the place of microbes in the great scheme of Nature, the moral responsibilities of teachers of arithmetic, the problem of the Jew, and leishmaniasis in Venezuela.

A. A.

NEVEU-LEMAIRE. **Précis de parasitologie humaine.**—vi + 466 pp. With 313 text figs. 5th Edition. 1921. Paris: J. Lamarre, 4, rue Antoine-Dubois. [Price 22 fr., or post free 24.50.]

This is a students' text-book, in which all the parasites of man—using the term "parasite" in its most comprehensive sense—are reviewed in systematic order, and the more important facts of their individual structure, life-history, and pathological significance are condensed with a minimum of recensory impedimenta. The bacteria occupy 17 pages, the fungi 71, the protozoa 80, the flatworms and roundworms 120, and the arthropods 115. In the section dealing with protozoa three pages are devoted to *Entamoeba histolytica* and amoebiasis, five to coccidia, four to trichomonads and Lamblia, 14 to malaria parasites and malaria, and 10½ to trypanosomes and trypanosomiasis. Although the number of pages is less in this than in the immediately preceding edition, this is due, not to any retrenchment of the matter, for the matter is increased, but to typographical rearrangements. That the book supplies a want, and is appreciated, is proved by the fact of its reaching a fifth edition.

A. A.

"LEWIS'S—1844–1921."

In a pamphlet entitled "Seventy-seven Years, 1844–1921" Messrs. H. K. Lewis & Co., Ltd., give an interesting account of their firm's development from the little bookshop, above which Mr. H. K. Lewis lived when the business started in 1844, into the well-known publishing and bookselling house of to-day. Illustrations and short descriptions are given of the activities of the various branches of the business, including the Publishing and Wholesale Department, the Bookselling and Medical Stationery Departments, the Postal Department, the Circulating Library, which now contains about 21,000 volumes, the Reading and Writing Room, and the most recently added Secondhand Book Department

BIBLIOGRAPHY ON HOOKWORM DISEASE.

The Rockefeller Foundation (61, Broadway, New York, U.S.A.) announce that a Bibliography on Hookworm Disease of about 450 pages will shortly be ready for distribution as Publication No. 11 of the International Health Board, and that, so far as a limited edition will allow, copies will be sent to all especially interested persons who make application to the Rockefeller Foundation.